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WATER QUALITY CONSERVATION, ARKANSAS-RED RIVER BASINS APPENDIX. VOLUME II - WATER QUALITY DATA. PART 2. CHEMICAL ANALYSES

Public Health Service
Dallas, Texas

March 1964

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ARKANSAS-RED RIVER BASINS
APPENDIX
VOLUME II - WATER QUALITY DATA
Part 2
Chemical Analyses

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MARCH 1964

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INTRODUCTION

The compilation of water quality data collected during the 27-month period of intensive study (July 1960 through September 1962) of the Arkansas-Red River Basins Water Quality Conservation Project is presented in five parts. These data were gathered to provide a basis for (1) location and definition of the significant natural and manmade sources of salt (mineral) pollution, and (2) determination of the effects of these sources on the quality of water in the receiving streams. The intensive investigation of water quality and natural sources of mineral pollution was limited to the central portions of both basins, the area in which major salt sources exist, and mineral pollution is most severe.

Stream quality monitoring consisted of continuous specific conductance recording combined with continuous flow measurement (flow gaging was carried out by U.S. Geological Survey and U.S. Army Corps of Engineers). Weekly grab samples were collected and analyzed to provide a basis for correlation of specific conductance with dissolved solids, chlorides, and sulfate concentration. In addition to these, samples were collected for trace elements and radioactivity analyses.

Streams uniformity analysis were run to corroborate the applicability of the continuous record of specific conductance or to provide a guide for adjustment sampling point within the stream cross section.

This report is Part 2 of Volume 2 and discusses the

The five parts of Volume II are arranged as follows.

Part 1 Monthly Summary of Continuous Recorded Flow and Quality Data.
Daily Flow and Continuous Recorded Quality Data.
Chemical Analyses of Natural Brines Sources.

Part 2 Chemical Analyses.

Part 3 Stream Uniformity Study Data and Basis for Correlation of Specific Conductance and Chemical Analyses - Arkansas River Basin.

Part 4 Stream Uniformity Study Data and Basis for Correlation of Specific Conductance and Chemical Analyses - Red River Basin.

Part 5 Trace Elements Analyses.
Radioactivity Record.
Index to tabulations.

The first year of stream monitoring included 64 stations, and 55 during the second year. These stations are located as shown on Figure 1. The Public Health Service is continuing the operation of a surveillance monitoring network at 36 stations and is continuing other special field studies related to this problem.

Explanation of Tabulations

General

Data tabulations are arranged according to basin in upstream order. The downstream station on the main stem is first, followed by the next upstream station. Where a tributary enters between two main stem stations, all of its stations in a upstream order are shown between the two main stream stations.

The following general identification is provided for each tabulation of data except the chemical analyses of natural brine sources(in Part 1 of this volume).

> Public Health Service Station Number (No.): This number was assigned to identify each monitoring station location. (See the "Monthly Summaries of Continuous Recorded Flow and Quality Data" in Part I of this volume for U.S. Geological Survey - USGS-Station Number when applicable.)
>
> Location: Designates the stream monitored and the general location of the station with respect to the nearest community. The geodetic description of the station is presented on the "Monthly Summary of Continuous Recorded Flow and Quality Data" in Part 1 of this volume.
>
> Basin: Indicates the major basin in which the water quality monitoring station is located.
>
> Tributary to: Identifies the stream to which the monitored stream is tributary, when the watercourse being monitored is other than the Arkansas or Red Rivers.

All data computations were made by the Statistical Services Section, Sanitary Engineering Center, U.S. Public Health Service, Cincinnati, Ohio, using a Honeywell 400 computer. All programming and related work were done by personnel of the Statistical Services Section, with the aid of Project personnel and personnel of the Field Operations Section, Technical Services Branch, Water Supply and Pollution Control Division, Cincinnati, Ohio.

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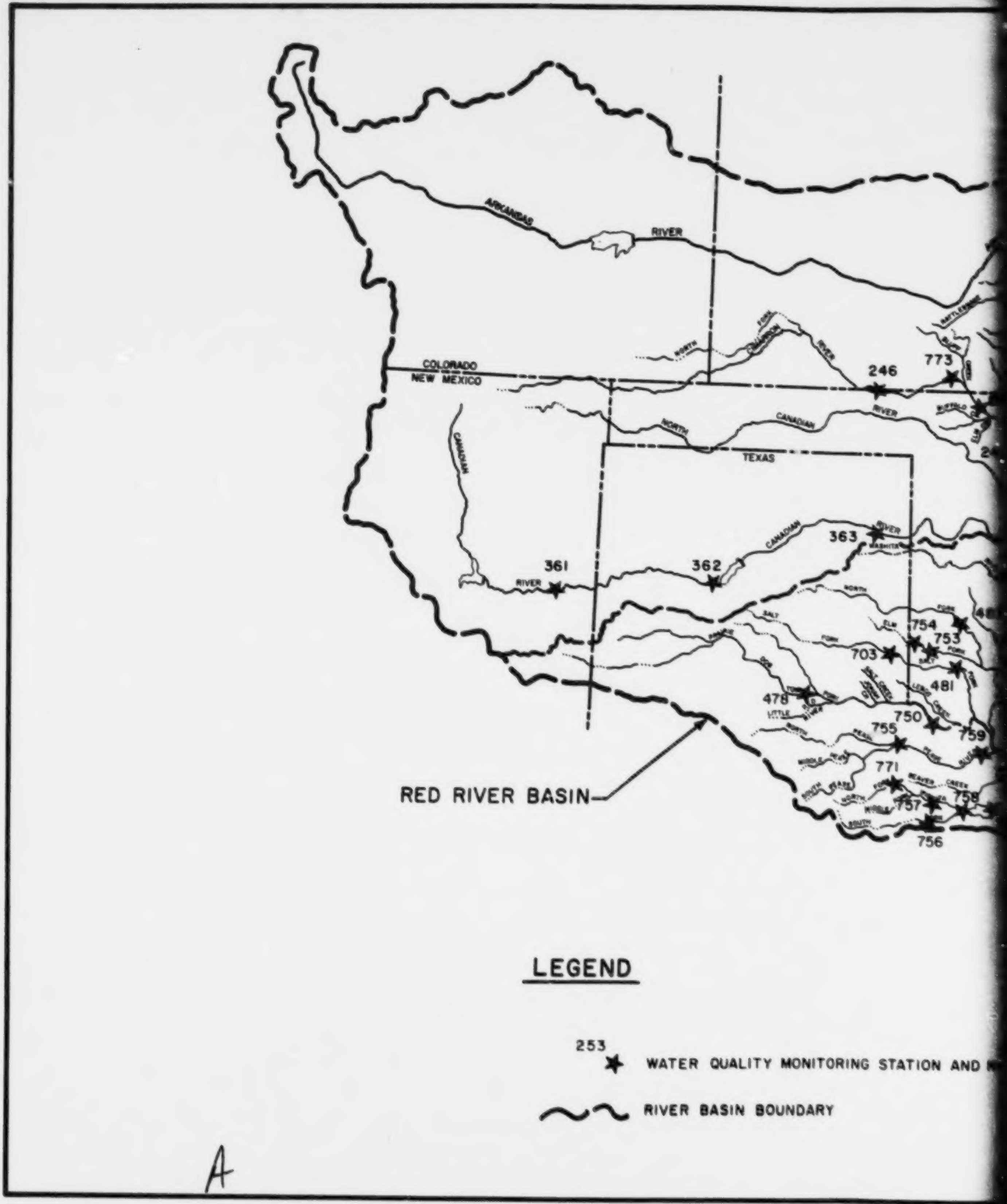
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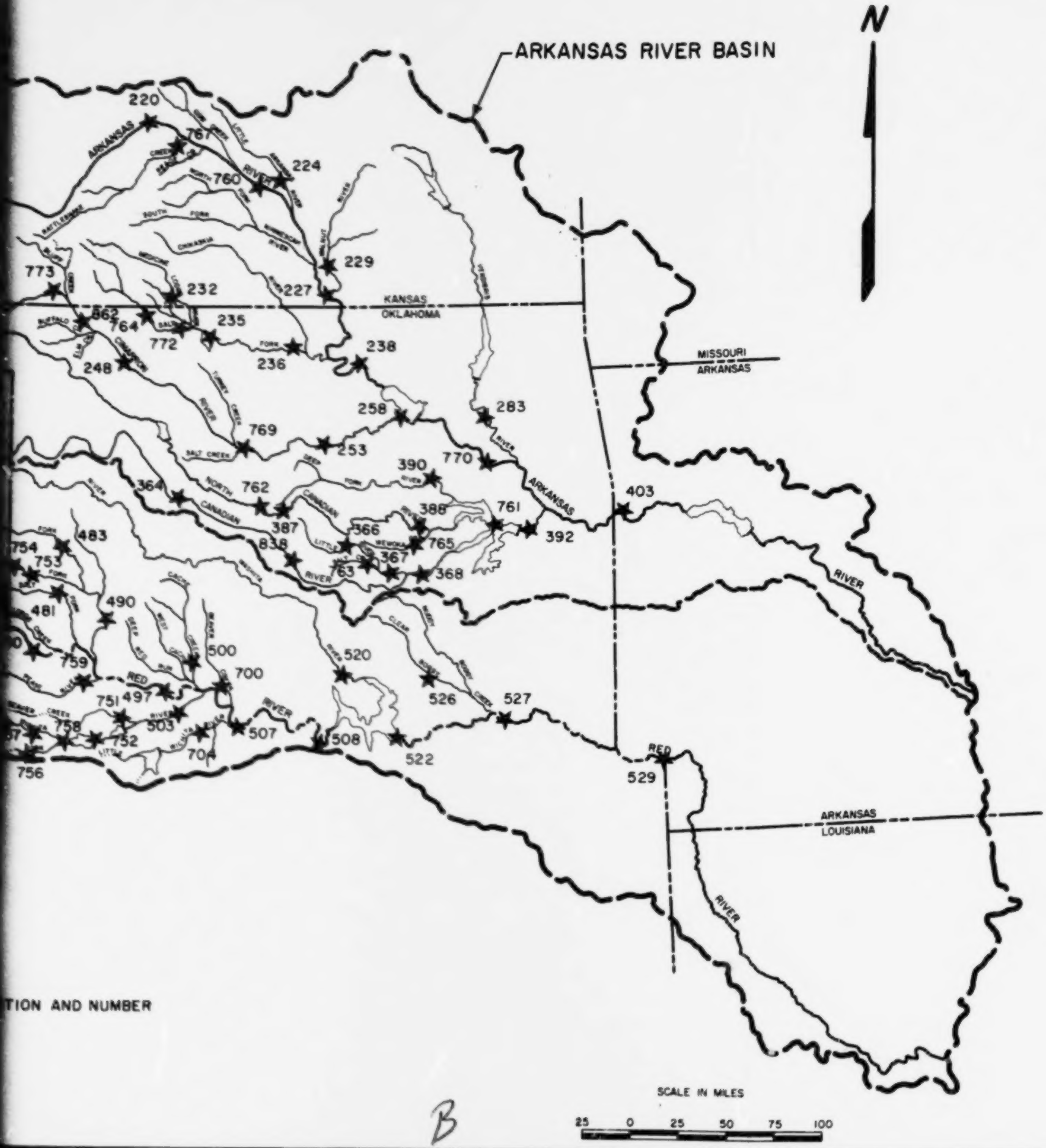N
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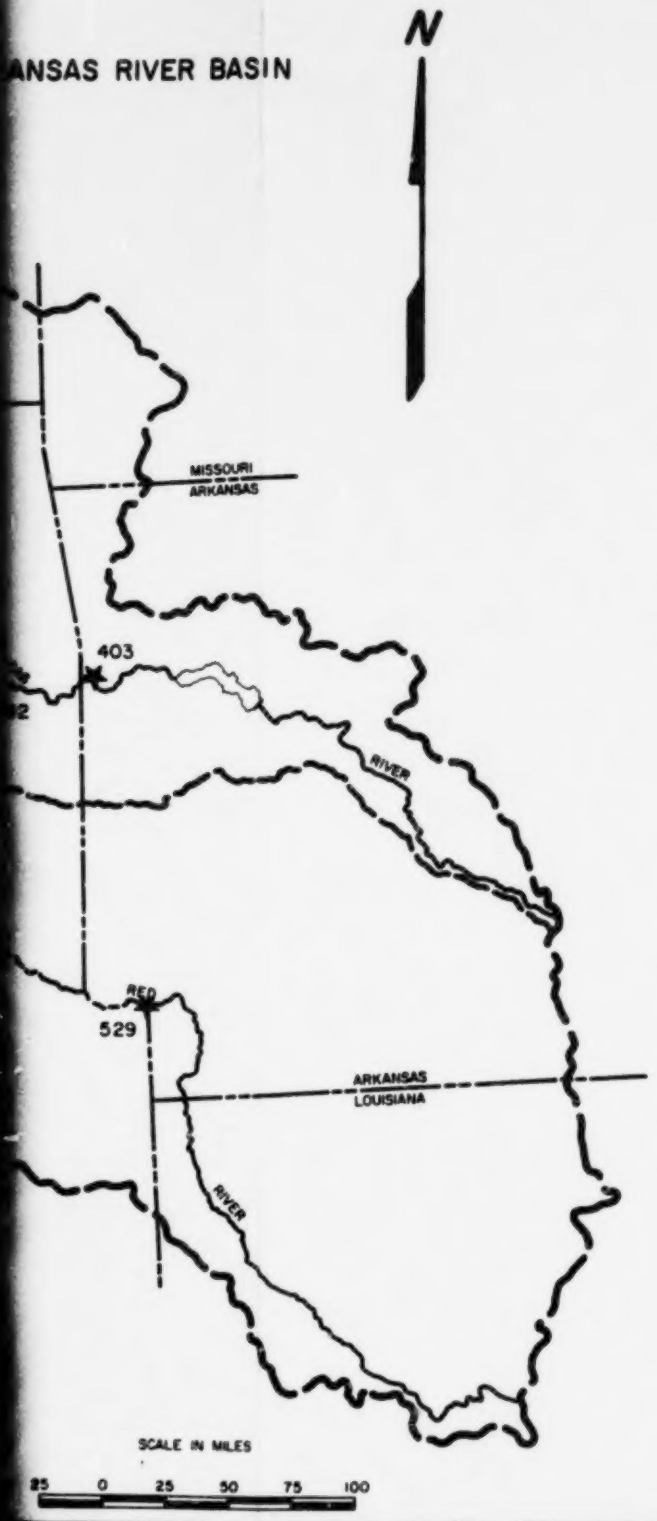
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ARKANSAS—RED RIVER BASINS
WATER QUALITY CONSERVATION PROJECT

WATER QUALITY
MONITORING STATIONS

U.S. DEPARTMENT OF HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
REGION VII DALLAS, TEXAS

FIGURE 1

All chemical analyses, unless otherwise noted, and radioactivity measurement, were carried out in accordance with procedures set forth in "Standard Methods for the Examination of Water and Wastewater," 11th edition, 1960, American Public Health Association, New York 19, New York, except sulfate determinations in the Public Health Service laboratories, where a modified turbidimetric procedure was used to improve accuracy. Rare metals (included in Trace Elements Analyses) were analyzed by semi-quantitative spectrographic procedures.

Part 1

Monthly Summary of Continuous Recorded Flow and Quality Data

This tabulation summarizes the two basic measurements, continuous specific conductance and continuous streamflow. The bases for this tabulation are the "Daily Flow and Continuous Recorded Quality Data" which follow the summary tabulations.

Correlations between conductance and concentration of chlorides, sulfates, and dissolved solids, were determined for each station from analyses of weekly grab samples collected during the study (see Parts 3 and 4 of this volume for the tabulations of "Basis for Correlation of Specific Conductance and Chemical Analyses"). These individual correlations were used to compute constituent concentrations. The correlation equations are shown for each tabulation. Flow measurements were then used to translate concentrations in mg/l to load in tons per day.

Also presented as a part of this tabulation is a summary of main stream flow data consisting of mean annual flow for the period of record and the range of annual flows, in cubic feet per second (cfs), together with an indication of the period or flow record (in years).

"Remarks" are comments on conditions during the period of intensive study.

All tabulations indicate zero (0) when the measurement was zero and a dash (-) when no data were obtained.

All flow data included in this compilation are provisional data furnished by the U.S. District Office of the Surface Water Branch of the U.S. Geological Survey in Arkansas, Kansas, New Mexico, Oklahoma, and Texas. The maximum and minimum of the daily means are shown for each month and for the entire year. Complete flow measurements are shown in this part including periods when no specific conductance was measured.

Weighted Mean (Wt. Mean) - This value in mg/l of the mineral constituent for any period (day, month, or year) is the total weight of the constituent divided by total volume of flow for the period of measurement. The specific conductance, as measured continuously, was weighted similarly for any period. The concentration of each constituent was computed from the specific conductance, using correlation equations derived from laboratory analyses of weekly grab samples.

The tabulation shows the highest and lowest of the daily means of specific conductance recorded and concentration computed during each month and the water year. Instantaneous maximum and minimum of each constituent for the water year are shown under "Remarks". A zero daily mean concentration (and load) representing a zero daily flow was not considered in selection of the monthly and annual minimum daily means. Zero daily flows are shown, however.

When continuous specific conductance measurements were not obtained for a significant portion of the total streamflow in a water year, an engineering review was made of the nonmeasured periods and reasonable quality estimates assigned to all or a portion of the flow. Flow rates, flow patterns, continuous recorder qualities before and after the no-record period, similarity of flows and patterns to measured periods, and results of grab samples were used to select reasonable estimates of quality for periods up to several weeks.

Chemical Analyses of Natural Brine Sources

This is a tabulation of the results of chemical analyses of grab samples collected at the various natural brine sources described in Volume I of this appendix and located as shown on Figure 2 (at the back of Part 1 of Volume II).

Each tabulation is identified as to Area Location, Area No. as designated on maps and charts, Collection Point, Basin (River) in which the brine source is located, and tributary to which the source emits. RATSEC designates the Robert A. Taft Sanitary Engineering Center and USGS designates the U.S. Geological Survey.

Part 2

Chemical Analyses

All tabulations are in accordance with general conditions previously described.

Part 3

Stream Uniformity Study Data and Basis for Correlation of Specific Conductance and Chemical Analyses - Arkansas River Basin

Part 4

Stream Uniformity Study Data and Basis for Correlation of Specific Conductance and Chemical Analyses - Red River Basin

The tabulations of stream uniformity study data presented in these parts (3 and 4) are sections of specific conductance across the various watercourses from left bank to right looking downstream together with stream width and flow at the time of sectioning.

Uniformity of stream quality or representativeness of the specific conductance recorder measurements is reported in the "Remarks" on the Summary Tabulations in Part 1 of Volume II. In general, the recorded conductances were a good representation of the average conductivity of the stream. Quality differences occurred occasionally at some stations, especially during high flows. Uniformity was determined from the results of three to eight section samples. Stations on frequently stratified streams were relocated to provide better records.

These parts also include tabulations of the "Basis for Correlation of Specific Conductance and Chemical Analyses" used to derive the summary data presented in Part 1 of Volume II.

Part 5

Trace Elements Analyses and Radioactivity Record

All tabulations are in accordance with general conditions previously described.

CHEMICAL ANALYSES

CHEMICAL ANALYSES

PHS Station No.: 403
Location: Arkansas River at Van Buren, Arkansas
Basin: Arkansas River
Tributary to:

Date collected:	10/26/59	12/7/59	12/22/59	1/27/60	2/15/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	2:10 pm	8:45 am	4:20 pm	3:50 pm
Temperature of stream: °F	--	--	46	42	38
Discharge (cfs)	80,000	16,000	60,100	24,200	33,600
Spec. cond. micromhos @ 25° C (field)	--	1,000	640	900	--
Spec. cond. micromhos @ 25° C (lab.)	533	960	700	1,000	1,100
pH	7.4	7.8	7.4	7.4	7.5
Turbidity, Jackson units	--	200	350	200	--
Dissolved solids*	312	615	436	594	620
Boron (B)	0.05	0.11	0.09	0.16	.11
Calcium (Ca)	50	75	52	64	66
Magnesium (Mg)	5.1	12	10	3	11
Total Hardness ($CaCO_3$)	146	235	170	180	210
Sodium (Na)	54	140	93	130	(Na+K) 146
Potassium (K)	--	4	4.5	3.7	--
Chloride (Cl)	86	200	150	165	218
Sulfate(SO_4)	41	80	50	65	85
Alkalinity ($CaCO_3$)	99	130	90	140	131
Nitrate (N)	0.00	0.6	--	--	.0
Silica(SiO_2)	17	13.2	8.2	11.0	4.0
Fluoride (F)	0.1	0.4	0.2	0.16	.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 403
Location: Arkansas River at Van Buren, Arkansas
Basin: Arkansas River
Tributary to:

Date collected:	2/24/60	3/29/60	4/4/60	5/25/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:05 pm	10:10 am	6:20 pm	10:30 am	2:45 pm
Temperature of stream: °F	37	56	70	70	83
Discharge (cfs)	27,000	56,500	46,200	101,000	14,500
Spec. cond. micromhos @ 25° C (field)	1,400	740	840	300	1,200
Spec. cond. micromhos @ 25° C (lab.)	2,500	800	800	350	1,280
pH	8.1	7.9	8.0	7.9	8.0
Turbidity, Jackson units	250	370	--	600	600
Dissolved solids*	1,980	541	490	205	750
Boron (B)	.20	0.03	0.02	.03	.05
Calcium (Ca)	500	64	88	42	80
Magnesium (Mg)	68	58	24	9	17
Total Hardness ($CaCO_3$)	780	400	320	140	270
Sodium (Na)	275	103	90	23	150
Potassium (K)	8.5	3.7	4.4	8.0	5.4
Chloride (Cl)	180	150	120	25	250
Sulfate(SO_4)	625	65	105	35	110
Alkalinity ($CaCO_3$)	230	120	120	110	148
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	17.6	10.0	10.0	7.8	10.0
Fluoride (F)	0.9	0.8	0.36	.45	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 403
Location: Arkansas River at Van Buren, Arkansas
Basin: Arkansas River
Tributary to:

Date collected:	7/26/60	8/16/60	9/20/60	10/18/60	11/16/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	8:50 am	11:25 am	12:45 pm	11:00 am	11:00 am
Temperature of stream: °F	79	84	80	69	71
Discharge (cfs)	122,000	14,000	8,350	4,740	14,400
Spec. cond. micromhos @ 25° C (field)	265	960	1,100	1,550	1,050
Spec. cond. micromhos @ 25° C (lab.)	340	920	975	1,520	1,040
pH	7.9	8.1	7.8	7.5	7.7
Turbidity, Jackson units	800	< 25	400	48	120
Dissolved solids*	185	540	610	885	685
Boron (B)	0.08	0.13	0.18	0.10	0.21
Calcium (Ca)	40	68	64	77	68
Magnesium (Mg)	12	22	17	16	15
Total Hardness ($CaCO_3$)	150	260	230	260	230
Sodium (Na)	27	115	105	191	120
Potassium (K)	2.5	3.5	4.3	4.4	4.4
Chloride (Cl)	48	188	215	335	195
Sulfate(SO_4)	16	78	84	100	43
Alkalinity ($CaCO_3$)	102	136	136	156	212
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	7.1	7.5	9.1	6.7	7.5
Fluoride (F)	0.1	0.5	1.0	0.6	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 403
Location: Arkansas River at Van Buren, Arkansas
Basin: Arkansas River
Tributary to:

Date collected:	12/28/60	1/10/61	1/25/61	2/14/61	3/15/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	10:40 am	9:45 am	9:50 am	10:20 am	9:00 am
Temperature of stream: °F	39	39	32	50	55
Discharge (cfs)	12,500	7,840	7,450	8,250	16,500
Spec. cond. micromhos @ 25° C (field)	1,450	--	1,280	1,380	910
Spec. cond. micromhos @ 25° C (lab.)	1,450	1,210	1,720	1,370	920
pH	6.9	7.2	7.3	7.4	7.4
Turbidity, Jackson units	--	--	--	67	120
Dissolved solids*	821	713	1,025	783	513
Boron (B)	.12	.26	.105	.15	.09
Calcium (Ca)	80	65	96	72	56
Magnesium (Mg)	12	21	22	46	15
Total Hardness ($CaCO_3$)	250	250	330	370	200
Sodium (Na)	205	155	225	170	100
Potassium (K)	4.4	--	3.8	3.8	2.8
Chloride (Cl)	310	252	385	285	175
Sulfate(SO_4)	100	88	125	111	71
Alkalinity ($CaCO_3$)	144	139	188	140	112
Nitrate (N)	--	.0	--	--	--
Silica(SiO_2)	7.2	7.2	7.3	5.2	4.7
Fluoride (F)	.48	.5	.59	.44	.50

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 403
Location: Arkansas River at Van Buren, Arkansas
Basin: Arkansas River
Tributary to:

Date collected:	4/11/61	4/18/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	10:40 am	9:15 am	11:55 am		
Temperature of stream: °F	52	54	67		
Discharge (cfs)	--	42,000	213,000		
Spec. cond. micromhos @ 25° C (field)	--	890	315		
Spec. cond. micromhos @ 25° C (lab.)	675	854	392		
pH	7.7	7.5	7.05		
Turbidity, Jackson units	--	142	650		
Dissolved solids*	389	504	220		
Boron (B)	.31	.27	.06		
Calcium (Ca)	47	64	40		
Magnesium (Mg)	11	17	6		
Total Hardness ($CaCO_3$)	164	230	124		
Sodium (Na)	75	80	14		
Potassium (K)	--	2.8	3.4		
Chloride (Cl)	108	150	34		
Sulfate(SO_4)	65	78	44		
Alkalinity ($CaCO_3$)	105	128	80		
Nitrate (N)	.2	--	--		
Silica(SiO_2)	6.2	11.8	7.7		
Fluoride (F)	.5	.55	.34		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 392
Location: Canadian River near Whitefield, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/26/59	12/7/59	12/21/59	1/28/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	2:50 pm	12:35 pm	5:45 pm	9:10 pm	9:00 am
Temperature of stream: °F	--	--	47	40	35
Discharge (cfs)	1,930	1,160	17,000	3,870	5,200
Spec. cond. micromhos @ 25° C (field)	--	2,100	410	1,500	--
Spec. cond. micromhos @ 25° C (lab.)	1,520	2,100	550	1,300	1,220
pH	7.7	7.8	7.6	7.6	8.1
Turbidity, Jackson units	--	< 25	600	280	--
Dissolved solids*	816	1,870	395	860	710
Boron (B)	0.13	0.11	0.09	0.12	0.16
Calcium (Ca)	89	135	68	88	78
Magnesium (Mg)	45	36	2.4	12	23
Total Hardness ($CaCO_3$)	405	485	180	340	290
Sodium (Na)	(Na+K) 152	290	50	150	(Na+K) 143
Potassium (K)	--	6.0	3.7	4.2	--
Chloride (Cl)	325	535	110	270	230
Sulfate(SO_4)	75	70	30	67	104
Alkalinity ($CaCO_3$)	197	290	110	190	164
Nitrate (N)	0.43	--	--	--	0.5
Silica(SiO_2)	10.0	12.8	13.0	11.8	5.0
Fluoride (F)	0.3	0.7	0.4	0.38	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 392
Location: Canadian River near Whitefield, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/24/60	3/29/60	4/5/60	5/25/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	1:35 pm	11:50 am	4:00 pm	1:00 pm	4:30 pm
Temperature of stream: °F	36	64	70	72	89
Discharge (cfs)	4,000	3,900	2,880	28,000	1,950
Spec. cond. micromhos @ 25° C (field)	1,400	950	1,820	260	1,270
Spec. cond. micromhos @ 25° C (lab.)	1,200	1,040	1,800	360	1,300
pH	8.0	7.9	7.9	8.4	7.7
Turbidity, Jackson units	350	100	--	380	450
Dissolved solids*	755	670	1,183	215	794
Boron (B)	0.14	0.09	0.10	0.039	0.3
Calcium (Ca)	88	72	116	40	92
Magnesium (Mg)	22	44	27	2.5	27
Total Hardness ($CaCO_3$)	310	360	400	110	340
Sodium (Na)	135	120	215	21	142
Potassium (K)	3.9	3.9	5.5	3.3	5.5
Chloride (Cl)	230	210	410	35	260
Sulfate(SO_4)	85	68	103	12	85
Alkalinity ($CaCO_3$)	170	170	200	110	188
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	8.8	8.6	9.2	6.8	9.7
Fluoride (F)	0.4	0.8	0.46	0.0	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 392
Location: Canadian River near Whitefield, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/26/60	8/16/60	9/20/60	10/18/60	11/16/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection.	4:10 pm	1:30 pm	2:40 pm	2:30 pm	1:15 pm
Temperature of stream: °F	83	82	83	65	63
Discharge (cfs)	31,400	6,300	376	1,480	850
Spec. cond. micromhos @ 25° C (field)	330	1,250	1,700	957	1,180
Spec. cond. micromhos @ 25° C (lab.)	360	--	1,550	1,070	1,145
pH	7.8	--	7.9	7.2	7.5
Turbidity, Jackson units	850	> 5,000	> 25	> 5,000	350
Dissolved solids*	248	--	900	610	660
Boron (B)	0.11	0.20	0.23	0.17	0.16
Calcium (Ca)	40	--	80	70	80
Magnesium (Mg)	9	--	44	30	24
Total Hardness ($CaCO_3$)	136	--	380	300	300
Sodium (Na)	35	--	175	141	120
Potassium (K)	2.6	--	6.5	5.0	5.3
Chloride (Cl)	62	260	375	165	200
Sulfate(SO_4)	14	115	65	118	108
Alkalinity ($CaCO_3$)	108	--	178	164	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	6.3	9.7	10.0	10.7	9.4
Fluoride (F)	0.3	--	0.6	0.9	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	392
Location:	Canadian River near Whitefield, Oklahoma
Basin:	Arkansas River
Tributary to:	Arkansas River

Date collected:	12/28/60	1/10/61	1/25/61	2/14/61	3/15/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	8:10 am	12:50 pm	11:50 am	12:15 pm	10:50 am
Temperature of stream: °F	37	39	32	53	60
Discharge (cfs)	1,370	1,470	1,090	1,690	1,370
Spec. cond. micromhos @ 25° C (field)	1,350	--	1,650	1,200	1,200
Spec. cond. micromhos @ 25° C (lab.)	1,646	1,230	1,650	1,220	1,230
pH	7.3	8.2	7.5	7.5	7.8
Turbidity, Jackson units	--	--	--	142	200
Dissolved solids*	799	755	983	703	705
Boron (B)	0.15	0.59	0.15	0.10	0.22
Calcium (Ca)	84	80	100	76	68
Magnesium (Mg)	32	29	36	29	29
Total Hardness ($CaCO_3$)	340	320	400	310	290
Sodium (Na)	141	(Na+K) 132	173	120	135
Potassium (K)	4.5	--	4.9	4.9	3.8
Chloride (Cl)	240	235	325	245	225
Sulfate(SO_4)	120	85	128	89	92
Alkalinity ($CaCO_3$)	204	184	224	156	164
Nitrate (N)	--	0.6	--	--	--
Silica(SiO_2)	10.0	10.0	10.1	5.8	8.4
Fluoride (F)	0.48	0.3	0.10	0.34	0.60

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 392
Location: Canadian River near Whitefield, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/11/61	4/18/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	9:00 am	7:30 am	10:15 am		
Temperature of stream: °F	54	55	70		
Discharge (cfs)	9,800	2,990	3,220		
Spec. cond. micromhos @ 25° C (field)	--	1,030	800		
Spec. cond. micromhos @ 25° C (lab.)	1,150	1,010	836		
pH	7.8	7.6	7.5		
Turbidity, Jackson units	--	265	310		
Dissolved solids*	676	613	501		
Boron (B)	0.41	0.06	0.23		
Calcium (Ca)	70	72	60		
Magnesium (Mg)	26	27	19		
Total Hardness ($CaCO_3$)	280	290	230		
Sodium (Na)	141	115	80		
Potassium (K)	--	3.9	3.8		
Chloride (Cl)	215	180	135		
Sulfate(SO_4)	99	95	740		
Alkalinity ($CaCO_3$)	177	148	132		
Nitrate (N)	0.4	--	--		
Silica(SiO_2)	8.4	9.0	7.1		
Fluoride (F)	0.4	0.55	0.50		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 761
Location: North Canadian River near Eufaula, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	10/26/59	12/7/59	12/21/59	1/28/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	11:40 am	4:45 pm	10:00 am	9:50 am
Temperature of stream: °F	--	--	47	40	37
Discharge (cfs)	--	--	--	--	--
Spec. cond. micromhos @ 25° C (field)	--	2,500	490	1,500	--
Spec. cond. micromhos @ 25° C (lab.)	1,520	2,500	600	1,550	1,210
pH	7.5	7.7	7.5	7.7	7.7
Turbidity, Jackson units	--	< 25	400	100	--
Dissolved solids*	823	1,760	360	970	720
Boron (B)	0.16	0.11	0.18	0.66	0.11
Calcium (Ca)	116	150	46	92	85
Magnesium (Mg)	22	41	8	17	23
Total Hardness ($CaCO_3$)	380	545	150	300	305
Sodium (Na)	162	360	64	215	135
Potassium (K)	--	8.0	4.1	4.2	--
Chloride (Cl)	335	706	135	370	235
Sulfate(SO_4)	49	52	15	50	91
Alkalinity ($CaCO_3$)	207	260	80	180	171
Nitrate (N)	0.29	--	--	--	--
Silica(SiO_2)	13	14.8	8.2	12.2	8.0
Fluoride (F)	0.3	0.5	0.4	0.38	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 761
Location: North Canadian River near Eufaula, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	2/24/60	3/29/60	4/5/60	5/25/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	2:40 pm	1:15 am	11:35 am	4:00 pm	5:50 pm
Temperature of stream: °F	36.5	65	70	78	88
Discharge (cfs)	--	--	--	--	--
Spec. cond. micromhos @ 25° C (field)	1,500	1,375	1,790	430	1,600
Spec. cond. micromhos @ 25° C (lab.)	1,200	1,500	1,750	450	1,700
pH	8.1	7.8	8.0	7.9	7.6
Turbidity, Jackson units	200	90	--	--	65
Dissolved solids*	840	1,000	1,164	275	985
Boron (B)	0.28	0.14	0.13	0.2	0.1
Calcium (Ca)	80	100	124	35	92
Magnesium (Mg)	30	29	19	13	39
Total Hardness ($CaCO_3$)	330	370	390	140	390
Sodium (Na)	150	205	205	42	195
Potassium (K)	4.6	7.5	5.2	17.0	6.2
Chloride (Cl)	290	340	410	80	415
Sulfate(SO_4)	68	128	95	18	55
Alkalinity ($CaCO_3$)	160	200	190	110	170
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	8.6	7.8	9.2	8.2	8.1
Fluoride (F)	0.9	0.7	0.45	0.12	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No. 761
Location: North Canadian River near Eufaula, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	7/26/60	8/16/60	9/21/60	10/18/60	11/16/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	5:20 pm	2:30 pm	7:30 am	3:45 pm	2:15 pm
Temperature of stream: °F	81	84	72	65	61
Discharge (cfs)	580	400	175	230	482
Spec. cond. micromhos @ 25° C (field)	320	1,340	2,150	1,800	1,120
Spec. cond. micromhos @ 25° C (lab.)	250	1,340	1,850	1,675	1,150
pH	7.9	8.1	8.0	7.5	7.8
Turbidity, Jackson units	400	37	$<$ 25	50	190
Dissolved solids*	165	850	1,110	915	645
Boron (B)	0.11	0.16	0.27	0.20	0.20
Calcium (Ca)	20	80	84	84	76
Magnesium (Mg)	12	36	41	24	27
Total Hardness ($CaCO_3$)	100	350	380	310	300
Sodium (Na)	25	172	290	190	100
Potassium (K)	6.4	5.8	6.6	7.5	6.2
Chloride (Cl)	52	335	510	75	190
Sulfate(SO_4)	11	54	83	75	110
Alkalinity ($CaCO_3$)	36	240	168	160	132
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	5.4	10.0	5.8	5.2	8.8
Fluoride (F)	0	0.6	0.9	0.6	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 761
Location: North Canadian River near Eufaula, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	12/27/60	1/10/61	1/25/61	2/14/61	3/15/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	5:15 pm	1:30 pm	1:25 pm	5:30 pm	12:00 N
Temperature of stream: °F	38	41	32	57	64
Discharge (cfs)	582	523	307	462	--
Spec. cond. micromhos @ 25° C (field)	1,080	--	1,800	1,730	1,300
Spec. cond. micromhos @ 25° C (lab.)	1,113	1,430	1,840	1,770	1,380
pH	7.45	7.9	7.2	7.2	7.5
Turbidity, Jackson units	--	--	--	> 25	--
Dissolved solids*	619	864	1,102	1,007	754
Boron (B)	.15	.99	.17	.11	.10
Calcium (Ca)	68	77	104	96	80
Magnesium (Mg)	34	40	31	34	22
Total Hardness ($CaCO_3$)	310	355	390	380	290
Sodium (Na)	123	(Na+K) 152	193	185	155
Potassium (K)	5.3	--	6.8	7.4	5.0
Chloride (Cl)	180	308	420	390	300
Sulfate(SO_4)	77	56	95	47	59
Alkalinity ($CaCO_3$)	188	187	224	200	172
Nitrate (N)	--	1.5	--	--	--
Silica(SiO_2)	8.8	9.6	8.6	4.4	6.4
Fluoride (F)	0.48	0.3	0.70	0.49	0.55

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 761
Location: North Canadian River near Eufaula, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	4/10/61	4/17/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	8:00 am	4:30 pm	8:10 am		
Temperature of stream: °F	53	60	79		
Discharge (cfs)	1,930	1,750	2,400		
Spec. cond. micromhos @ 25° C (field)	--	960	780		
Spec. cond. micromhos @ 25° C (lab.)	1,040	1,008	765		
pH	7.9	7.5	7.8		
Turbidity, Jackson units	--	180	230		
Dissolved solids*	631	536	389		
Boron (B)	.46	.11	.18		
Calcium (Ca)	61	60	48		
Magnesium (Mg)	32	22	27		
Total Hardness ($CaCO_3$)	285	240	230		
Sodium (Na)	101	95	80		
Potassium (K)	--	3.9	5.5		
Chloride (Cl)	195	175	715		
Sulfate(SO_4)	84	74	40		
Alkalinity ($CaCO_3$)	138	120	128		
Nitrate (N)	.7	--	--		
Silica(SiO_2)	6.8	7.7	6.2		
Fluoride (F)	0.4	0.50	0.50		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 390
Location: Deep Fork near Beggs, Oklahoma
Basin: Arkansas River
Tributary to: North Canadian River

Date collected:	10/27/59	12/8/59	12/22/59	1/28/60	2/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	8:45 am	8:45 am	12:55 pm	12:50 pm	10:05 am
Temperature of stream: °F	--	--	45	41	37
Discharge (cfs)	270	183	1,920	649	687
Spec. cond. micromhos @ 25° C (field)	--	1,700	550	1,000	--
Spec. cond. micromhos @ 25° C (lab.)	1,190	1,600	700	1,100	989
pH	7.8	7.5	7.3	7.6	8.0
Turbidity, Jackson units	--	< 25	100	25	--
Dissolved solids*	630	1,020	388	684	552
Boron (B)	0.21	0.32	0.17	0.24	0.12
Calcium (Ca)	68	90	44	68	64
Magnesium (Mg)	38	45	17	32	29
Total Hardness ($CaCO_3$)	325	410	180	300	280
Sodium (Na)	118	200	69	120	(Na+K) 96
Potassium (K)	--	4	4.2	3.1	--
Chloride (Cl)	222	380	115	165	193
Sulfate(SO_4)	30	42	20	33	32
Alkalinity ($CaCO_3$)	236	250	140	180	180
Nitrate (N)	0.38	--	--	--	0.4
Silica(SiO_2)	10	12.0	8.0	11.6	8.0
Fluoride (F)	0.3	0.2	0.3	0.22	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.:	390
Location:	Deep Fork near Beggs, Oklahoma
Basin:	Arkansas River
Tributary to:	North Canadian River

Date collected:	2/24/60	3/28/60	4/4/60	5/24/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	8:40 am	2:30 pm	1:25 pm	4:30 pm	8:15 am
Temperature of stream: °F	37	60	70	75	81
Discharge (cfs)	592	432	352	4,080	205
Spec. cond. micromhos @ 25° C (field)	1,700	1,150	1,370	360	975
Spec. cond. micromhos @ 25° C (lab.)	1,200	1,200	1,360	350	940
pH	8.1	7.9	7.8	8.2	7.7
Turbidity, Jackson units	50	< 25	--	205	180
Dissolved solids*	768	730	808	230	603
Boron (B)	.15	0.15	0.13	.05	0.4
Calcium (Ca)	72	100	84	27	68
Magnesium (Mg)	46	41	36	30	27
Total Hardness ($CaCO_3$)	370	420	360	190	280
Sodium (Na)	135	70	145	31	100
Potassium (K)	3.1	11.0	3.8	4.0	4.0
Chloride (Cl)	215	255	265	50	188
Sulfate(SO_4)	42	55	55	23	22
Alkalinity ($CaCO_3$)	220	230	250	110	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	6.8	5.6	3.2	8.4	9.5
Fluoride (F)	0.5	0.9	0.36	.45	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	390
Location:	Deep Fork near Beggs, Oklahoma
Basin:	Arkansas River
Tributary to:	North Canadian River

Date collected:	7/25/60	8/15/60	9/19/60	10/17/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:15 pm	2:00 pm	1:00 pm	1:25 pm	12:15 pm
Temperature of stream: °F	77	82	79	67	60
Discharge (cfs)	2,900	112	29	27	88
Spec. cond. micromhos @ 25° C (field)	245	780	1,090	1,280	850
Spec. cond. micromhos @ 25° C (lab.)	210	710	940	1,250	800
pH	8.1	8.4	8.0	7.3	7.6
Turbidity, Jackson units	550	130	< 25	37	79
Dissolved solids*	127	495	565	710	425
Boron (B)	0.10	0.18	0.24	0.29	0.20
Calcium (Ca)	16	50	60	61	43
Magnesium (Mg)	4	22	31	33	25
Total Hardness ($CaCO_3$)	56	216	276	288	212
Sodium (Na)	24	66	96	131	79
Potassium (K)	3.0	3.8	4.1	5.0	4.5
Chloride (Cl)	44	124	188	240	126
Sulfate(SO_4)	10	32	41	70	39
Alkalinity ($CaCO_3$)	40	184	216	212	200
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	6.0	10.0	7.0	3.9	6.2
Fluoride (F)	0.10	0.6	0.5	0.6	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 390
Location: Deep Fork near Beggs, Oklahoma
Basin: Arkansas River
Tributary to: North Canadian River

Date collected:	12/28/60	1/9/61	1/24/61	2/13/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	4:20 pm	11:25 am	11:25 am	1:35 pm	11:00 am
Temperature of stream: °F	36	36	34	49	55
Discharge (cfs)	138	106	78	100	113
Spec. cond. micromhos @ 25° C (field)	830	--	1,200	1,250	1,200
Spec. cond. micromhos @ 25° C (lab.)	695	1,090	1,180	1,225	1,160
pH	7.3	7.8	7.6	7.4	7.6
Turbidity, Jackson units	--	--	--	> 25	85
Dissolved solids*	399	640	686	703	667
Boron (B)	.18	.75	.18	.23	.175
Calcium (Ca)	48	56	72	96	68
Magnesium (Mg)	27	37	44	24	32
Total Hardness ($CaCO_3$)	232	290	360	340	300
Sodium (Na)	73	114	116	135	105
Potassium (K)	4.1	--	3.9	5.0	4.5
Chloride (Cl)	134	200	220	225	212
Sulfate(SO_4)	39	43	54	55	41
Alkalinity ($CaCO_3$)	184	210	240	240	216
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	5.8	2.0	3.1	2.8	2.9
Fluoride (F)	.48	.4	.11	.34	.50

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 390
Location: Deep Fork near Beggs, Oklahoma
Basin: Arkansas River
Tributary to: North Canadian River

Date collected:	4/11/61	4/19/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	2:45 pm	8:00 am	4:50 am		
Temperature of stream: °F	53	60	72		
Discharge (cfs)	843	340	655		
Spec. cond. micromhos @ 25° C (field)	--	900	620		
Spec. cond. micromhos @ 25° C (lab.)	648	845	--		
pH	7.9	7.9	7.0		
Turbidity, Jackson units	--	103	305		
Dissolved solids*	377	590	2,480		
Boron (B)	.29	.3	.15		
Calcium (Ca)	36	56	132		
Magnesium (Mg)	18	24	46		
Total Hardness ($CaCO_3$)	164	--	520		
Sodium (Na)	68	80	690		
Potassium (K)	--	3.8	6.8		
Chloride (Cl)	118	158	1,060		
Sulfate(SO_4)	20	31	362		
Alkalinity ($CaCO_3$)	121	160	124		
Nitrate (N)	.3	--	--		
Silica(SiO_2)	7.2	--	7.3		
Fluoride (F)	.6	--	.66		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 765
Location: Wewoka Creek near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: North Canadian River

Date collected:	10/26/59	12/7/59	12/21/59	1/28/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	10:45 am	3:35 pm	3:00 pm	10:40 am
Temperature of stream: °F	--	--	45	43	37
Discharge (cfs)	33	33	396	184	169
Spec. cond. micromhos @ 25° C (field)	--	7,500	1,400	4,100	--
Spec. cond. micromhos @ 25° C (lab.)	6,490	7,800	1,580	5,000	5,120
pH	7.1	7.6	7.5	7.4	7.9
Turbidity, Jackson units	--	< 25	45	45	--
Dissolved solids*	3,670	5,830	1,033	3,100	3,210
Boron (B)	0.20	0.21	0.42	0.18	0.14
Calcium (Ca)	296	340	72	217	208
Magnesium (Mg)	61	110	24	52	68
Total Hardness ($CaCO_3$)	990	1,290	280	760	800
Sodium (Na)	1,030	1,300	7,000	745	(Na+K) 776
Potassium (K)	--	10	5.8	6.7	--
Chloride (Cl)	2,200	2,550	5,000	1,590	1,650
Sulfate(SO_4)	27	40	23	37	30
Alkalinity ($CaCO_3$)	94	150	60	120	128
Nitrate (N)	0.32	--	--	--	0.1
Silica(SiO_2)	0.00	2.8	9.2	10.4	6.5
Fluoride (F)	0.00	0.4	0.5	0.14	0.1

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 765
Location: Wewoka Creek near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: North Canadian River

Date collected:	2/24/60	3/29/60	4/6/60	5/26/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	4:00 pm	4:30 pm	11:00 am	11:00 am	6:30 am
Temperature of stream: °F	37.5	65	70	77	82
Discharge (cfs)	171	93	48	450	18
Spec. cond. micromhos @ 25° C (field)	5,900	6,000	3,900	1,800	8,100
Spec. cond. micromhos @ 25° C (lab.)	4,800	6,200	4,000	1,850	8,000
pH	8.0	7.6	7.8	7.3	7.5
Turbidity, Jackson units	< 25	125	--	160	< 25
Dissolved solids*	2,850	4,090	2,230	1,129	5,075
Boron (B)	0.10	0.15	0.09	0.05	1.1
Calcium (Ca)	195	240	140	72	432
Magnesium (Mg)	70	87	58	29	51
Total Hardness ($CaCO_3$)	780	960	590	300	1,290
Sodium (Na)	875	1,000	600	275	1,325
Potassium (K)	5.7	8.7	6.7	4.0	10.0
Chloride (Cl)	1,510	2,100	1,050	500	2,700
Sulfate(SO_4)	70	46	32	17	31
Alkalinity ($CaCO_3$)	110	140	110	210	108
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	5.0	3.2	4.2	7.1	4.0
Fluoride (F)	0.5	0.8	0.25	0.23	--

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 765
Location: Wewoka Creek near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: North Canadian River

Date collected:	7/27/60	8/18/60	9/21/60	10/18/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	7:00 am	9:10 pm	9:10 am	5:10 pm	4:35 pm
Temperature of stream: °F	84	80	76	58	68
Discharge (cfs)	35	22	0.5	72	3.4
Spec. cond. micromhos @ 25° C (field)	2,600	3,250	3,400	5,100	2,500
Spec. cond. micromhos @ 25° C (lab.)	2,200	3,200	2,800	5,000	2,400
pH	7.5	7.8	7.8	7.3	7.3
Turbidity, Jackson units	< 25	< 25	< 25	65	< 25
Dissolved solids*	1,465	1,890	1,735	2,870	1,370
Boron (B)	0.16	0.25	0.17	0.20	0.07
Calcium (Ca)	84	128	108	164	84
Magnesium (Mg)	39	61	51	53	34
Total Hardness ($CaCO_3$)	370	570	480	630	350
Sodium (Na)	385	480	390	688	300
Potassium (K)	5.0	4.3	1.9	6.9	5.5
Chloride (Cl)	780	1,040	950	1,450	690
Sulfate(SO_4)	16	28	18	35	25
Alkalinity ($CaCO_3$)	60	100	100	76	88
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	5.4	3.6	4.6	3.0	2.0
Fluoride (F)	0.5	0.6	0.4	0.4	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 765
Location: Wewoka Creek near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: North Canadian River

Date collected:	12/27/60	1/10/61	1/23/61	2/15/61	3/15/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	4:15 pm	2:45 pm	3:45 pm	9:20 am	4:20 pm
Temperature of stream: °F	38	41	40	54	65
Discharge (cfs)	--	24	13	18	21
Spec. cond. micromhos @ 25° C (field)	3,000	--	4,180	4,600	2,400
Spec. cond. micromhos @ 25° C (lab.)	2,970	2,210	3,950	4,300	2,400
pH	7.0	7.5	7.1	7.0	7.2
Turbidity, Jackson units	--	--	--	> 25	< 25
Dissolved solids*	1,652	1,340	2,332	2,553	1,294
Boron (B)	.14	.06	.12	.15	.07
Calcium (Ca)	120	86	160	152	88
Magnesium (Mg)	46	35	58	66	27
Total Hardness ($CaCO_3$)	490	360	640	660	330
Sodium (Na)	395	315	506	625	300
Potassium (K)	5.5	--	6.2	6.5	4.9
Chloride (Cl)	850	660	1,300	1,350	670
Sulfate(SO_4)	36	26	46	44	30
Alkalinity ($CaCO_3$)	92	85	116	92	88
Nitrate (N)	--	0.4	--	--	--
Silica(SiO_2)	7.5	6.4	3.6	2.2	2.6
Fluoride (F)	0.31	0.4	0.08	0.34	0.45

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 765
Location: Wewoka Creek near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: North Canadian River

Date collected:	4/10/61	4/17/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	4:15 pm	3:10 pm	5:00 pm		
Temperature of stream: °F	52	61	76		
Discharge (cfs)	152	74	71		
Spec. cond. micromhos @ 25° C (field)	--	2,850	2,350		
Spec. cond. micromhos @ 25° C (lab.)	3,210	2,688	2,870		
pH	7.8	7.5	7.1		
Turbidity, Jackson units	--	37	> 25		
Dissolved solids*	2,070	1,598	1,338		
Boron (B)	0.38	0.2	0.09		
Calcium (Ca)	123	108	112		
Magnesium (Mg)	49	41	30		
Total Hardness ($CaCO_3$)	510	230	410		
Sodium (Na)	454	310	305		
Potassium (K)	--	6.0	4.9		
Chloride (Cl)	975	800	720		
Sulfate(SO_4)	31	31	29		
Alkalinity ($CaCO_3$)	89	80	76		
Nitrate (N)	0.2	--	--		
Silica(SiO_2)	6.4	--	5.3		
Fluoride (F)	0.2	--	0.29		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 388
Location: North Canadian River near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	** 10/26/59	12/7/59	12/21/59	1/28/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	12:40 pm	10:20 am	3:15 pm	2:40 pm	11:00 am
Temperature of stream: °F	--	--	47	45	38
Discharge (cfs)	499	284	2100	563	1410
Spec. cond. micromhos @ 25° C (field)	--	2500	600	2000	--
Spec. cond. micromhos @ 25° C (lab.)	2100	2700	750	2200	1330
pH	7.8	7.7	7.5	7.6	7.9
Turbidity, Jackson units	--	< 25	1200	120	--
Dissolved solids*	1160	1960	468	1310	800
Boron (B)	0.00	0.20	0.25	0.20	.19
Calcium (Ca)	124	250	68	120	95
Magnesium (Mg)	41	TR	24	39	27
Total Hardness ($CaCO_3$)	480	620	270	460	350
Sodium (Na)	253	380	73	250	141
Potassium (K)	--	9.0	4.2	6.5	--
Chloride (Cl)	495	705	145	480	232
Sulfate(SO_4)	76	70	20	100	140
Alkalinity ($CaCO_3$)	492	310	160	220	180
Nitrate (N)	1.44	--	--	--	0.2
Silica(SiO_2)	13.0	16.4	10.4	14.8	8.0
Fluoride (F)	0.5	0.6	1.2	0.52	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

** Analytical results expressed as parts per million except as noted (column one only).

CHEMICAL ANALYSES

PHS Station No.: 388
Location: North Canadian River near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	2/24/60	3/29/60	4/6/60	5/26/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	4:35 pm	3:10 pm	11:45 am	8:15 am	7:05 am
Temperature of stream: °F	33	67	70	82	80
Discharge (cfs)	743	698	595	1140	560
Spec. cond. micromhos @ 25° C (field)	2000	1700	1730	900	1850
Spec. cond. micromhos @ 25° C (lab.)	1600	1950	1750	920	1900
pH	8.2	7.4	7.8	7.9	7.9
Turbidity, Jackson units	250	120	--	440	100
Dissolved solids*	1070	1390	1162	650	1215
Boron (B)	0.27	0.15	0.12	0.17	0.2
Calcium (Ca)	104	124	120	80	108
Magnesium (Mg)	49	39	34	19	41
Total Hardness ($CaCO_3$)	460	470	440	280	440
Sodium (Na)	190	263	225	100	220
Potassium (K)	6.5	8.2	7.4	5.4	7.8
Chloride (Cl)	330	440	370	170	460
Sulfate(SO_4)	120	110	160	50	85
Alkalinity ($CaCO_3$)	200	250	220	190	200
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	11.4	12.2	11.6	9.7	9.5
Fluoride (F)	0.9	0.7	0.76	0.22	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 388
Location: North Canadian River near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	7/27/60	8/18/60	9/21/60	10/19/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	8:25 am	10:15 am	9:45 am	7:20 am	3:35 pm
Temperature of stream: °F	84	78	75	60	68
Discharge (cfs)	1020	175	110	234	316
Spec. cond. micromhos @ 25° C (field)	625	1800	2350	1610	1250
Spec. cond. micromhos @ 25° C (lab.)	710	1800	2200	1560	1230
pH	7.6	8.0	7.9	7.3	7.7
Turbidity, Jackson units	1000	90	< 25	> 5000	120
Dissolved solids*	465	1110	1220	860	745
Boron (B)	0.15	0.24	0.23	0.21	0.16
Calcium (Ca)	69	84	72	60	84
Magnesium (Mg)	14	51	49	24	32
Total Hardness ($CaCO_3$)	230	420	380	250	340
Sodium (Na)	66	250	290	193	130
Potassium (K)	2.5	7.5	8.3	8.5	8.0
Chloride (Cl)	130	495	595	70	200
Sulfate(SO_4)	20	68	98	70	145
Alkalinity ($CaCO_3$)	172	232	128	104	188
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.4	9.6	4.0	8.0	10.0
Fluoride (F)	0.3	0.6	1.0	0.5	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 388
Location: North Canadian River near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	12/27/60	1/10/61	1/23/61	2/15/61	3/15/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	3:45 pm	3:05 pm	2:50 pm	10:55 am	5:05 pm
Temperature of stream: °F	39	44	43	56	70
Discharge (cfs)	192	156	204	252	251
Spec. cond. micromhos @ 25° C (field)	1950	--	1850	1650	1600
Spec. cond. micromhos @ 25° C (lab.)	2000	1880	1790	1600	1670
pH	7.5	7.8	7.5	7.7	7.5
Turbidity, Jackson units	--	--	--	> 25	--
Dissolved solids*	1118	1150	1158	947	1054
Boron (B)	0.20	0.51	0.18	0.11	0.18
Calcium (Ca)	120	114	108	96	100
Magnesium (Mg)	56	38	41	34	41
Total Hardness ($CaCO_3$)	530	440	440	380	420
Sodium (Na)	225	(Na+K) 215	170	155	180
Potassium (K)	7.5	--	7.9	8.3	7.8
Chloride (Cl)	415	415	375	290	295
Sulfate(SO_4)	90	62	145	57.5	170
Alkalinity ($CaCO_3$)	248	249	232	212	220
Nitrate (N)	--	2.2	--	--	--
Silica(SiO_2)	13.2	15.0	9.7	7.5	7.2
Fluoride (F)	0.70	0.5	0.87	0.70	0.92

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 388
Location: North Canadian River near Wetumka, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	4/10/61	4/17/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	3:45 pm	2:45 pm	5:45 pm		
Temperature of stream: °F	56	63	76		
Discharge (cfs)	1010	506	551		
Spec. cond. micromhos @ 25° C (field)	--	1500	1300		
Spec. cond. micromhos @ 25° C (lab.)	1180	1440	1390		
pH	7.6	7.6	7.75		
Turbidity, Jackson units	--	185	300		
Dissolved solids*	721	967	790		
Boron (B)	0.37	0.075	0.12		
Calcium (Ca)	78	96	96		
Magnesium (Mg)	32	39	44		
Total Hardness ($CaCO_3$)	325	400	420		
Sodium (Na)	125	150	180		
Potassium (K)	--	6.2	9.7		
Chloride (Cl)	200	225	230		
Sulfate(SO_4)	134	165	110		
Alkalinity ($CaCO_3$)	171	176	204		
Nitrate (N)	1.0	--	--		
Silica(SiO_2)	8.8	10.6	8.1		
Fluoride (F)	0.5	0.89	0.76		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 387
Location: North Canadian River near Oklahoma City, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	10/28/59	12/9/59	12/22/59	1/27/60	2/17/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	5:50 pm	11:30 am	1:30 pm	9:05 am	3:00 pm
Temperature of stream: °F	--	50	51	41	42
Discharge (cfs)	186	--	182	198	521
Spec. cond. micromhos @ 25° C (field)	--	4,000	1,850	2,100	--
Spec. cond. micromhos @ 25° C (lab.)	2,040	3,600	2,200	2,100	1,430
pH	7.5	7.9	7.4	7.6	7.4
Turbidity, Jackson units	--	< 25	< 25	< 25	--
Dissolved solids*	1,180	2,580	1,400	1,470	861
Boron (B)	0.35	0.04	0.38	0.24	0.22
Calcium (Ca)	113	200	112	132	93
Magnesium (Mg)	48	57	39	49	31
Total Hardness ($CaCO_3$)	480	740	440	530	360
Sodium (Na)	251	500	290	335	(Na+K) 164
Potassium (K)	--	19.0	10.0	9.3	--
Chloride (Cl)	410	1,030	515	470	250
Sulfate(SO_4)	179	170	150	190	176
Alkalinity ($CaCO_3$)	243	270	220	220	171
Nitrate (N)	4.3	--	--	--	2.2
Silica(SiO_2)		20.8	13.4	14.0	10.0
Fluoride (F)	0.9	1.0	0.8	0.72	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 387
Location: North Canadian River near Oklahoma City, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	2/23/60	3/28/60	4/4/60	5/23/60	6/27/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:15 am	9:45 am	10:00 am	2:55 pm	10:00 am
Temperature of stream: °F	36	56	70	81	80
Discharge (cfs)	310	321	--	350	106
Spec. cond. micromhos @ 25° C (field)	1,600	1,300	1,500	1,500	3,700
Spec. cond. micromhos @ 25° C (lab.)	1,600	1,500	1,420	1,440	3,300
pH	8.0	7.5	8.1	7.5	7.3
Turbidity, Jackson units	70	165	--	150	< 25
Dissolved solids*	1,140	970	959	940	1,960
Boron (B)	0.26	0.34	0.32	0.04	0.4
Calcium (Ca)	104	100	136	88	172
Magnesium (Mg)	44	58	17	32	58
Total Hardness ($CaCO_3$)	440	490	410	350	670
Sodium (Na)	190	173	167	200	470
Potassium (K)	8.4	7.0	7.6	7.8	12.5
Chloride (Cl)	330	230	220	290	935
Sulfate(SO_4)	220	210	225	140	135
Alkalinity ($CaCO_3$)	210	190	190	180	252
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	11.2	10.8	10.6	9.0	12.8
Fluoride (F)	0.9	0.7	0.71	0.49	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 387
Location: North Canadian River near Oklahoma City, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	7/25/60	8/15/60	9/19/60	10/17/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	1:45 pm	10:45 am	10:00 am	10:30 am	10:10 am
Temperature of stream: °F	89	80	77	67	67
Discharge (cfs)	181	58	55	59	152
Spec. cond. micromhos @ 25° C (field)	2,000	4,050	4,000	3,600	1,700
Spec. cond. micromhos @ 25° C (lab.)	1,850	3,750	3,800	3,550	1,620
pH	7.9	8.0	7.9	7.3	7.8
Turbidity, Jackson units	34	< 25	25	< 25	25
Dissolved solids*	1,235	2,360	2,315	2,100	990
Boron (B)	0.25	0.40	0.36	0.37	0.20
Calcium (Ca)	108	176	168	164	100
Magnesium (Mg)	34	66	68	56	39
Total Hardness ($CaCO_3$)	410	710	700	640	410
Sodium (Na)	258	550	455	440	175
Potassium (K)	4.2	13.9	14.2	15.8	9.0
Chloride (Cl)	470	1,060	1,050	225	280
Sulfate(SO_4)	130	230	230	225	212
Alkalinity ($CaCO_3$)	152	284	184	188	224
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.8	12.6	13.2	10.7	12 8
Fluoride (F)	0.8	0.9	1.1	1.0	0.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 387
Location: North Canadian River near Oklahoma City, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	12/29/60	1/9/61	1/24/61	2/13/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	1:15 pm	9:30 am	9:10 am	11:00 am	8:15 am
Temperature of stream: °F	38	39	36	49	51
Discharge (cfs)	51	43	85	229	149
Spec. cond. micromhos @ 25° C (field)	2,950	--	2,000	1,390	1,650
Spec. cond. micromhos @ 25° C (lab.)	2,860	3,070	2,100	1,400	1,710
pH	7.7	7.5	7.2	7.55	7.55
Turbidity, Jackson units	--	--	--	> 25	--
Dissolved solids*	1,682	1,950	1,354	875	1,028
Boron (B)	0.33	1.5	0.28	0.11	0.16
Calcium (Ca)	128	152	116	96	100
Magnesium (Mg)	49	56	46	34	51
Total Hardness ($CaCO_3$)	520	610	480	380	460
Sodium (Na)	325	(Na+K) 423	210	115	185
Potassium (K)	12.2	--	10.0	8.7	7.9
Chloride (Cl)	685	765	405	215	285
Sulfate(SO_4)	225	177	300	47	218
Alkalinity ($CaCO_3$)	208	246	212	196	212
Nitrate (N)	--	5.6	--	6.2	--
Silica(SiO_2)	14.0	15.0	10.1	0.70	10.6
Fluoride (F)	1.09	--	1.09	--	0.81

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 387
Location: North Canadian River near Oklahoma City, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	4/11/61	4/19/61	5/17/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	3:40 pm	2:55 pm	4:45 pm		
Temperature of stream: °F	57	78	80		
Discharge (cfs)	449	86	637		
Spec. cond. micromhos @ 25° C (field)	--	2,400	1,400		
Spec. cond. micromhos @ 25° C (lab.)	1,330	2,352	1,478		
pH	7.6	7.6	7.95		
Turbidity, Jackson units	--	> 25	90		
Dissolved solids*	819	1,449	895		
Boron (B)	0.65	0.29	0.15		
Calcium (Ca)	85	112	100		
Magnesium (Mg)	37	44	24		
Total Hardness ($CaCO_3$)	365	460	350		
Sodium (Na)	151	285	180		
Potassium (K)	--	12.3	9.3		
Chloride (Cl)	215	555	230		
Sulfate(SO_4)	194	175	212		
Alkalinity ($CaCO_3$)	180	164	164		
Nitrate (N)	1.9	--	--		
Silica(SiO_2)	8.0	11.4	7.3		
Fluoride (F)	0.6	1.22	1.12		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 762
Location: North Canadian River below Lake Overholser, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	** 10/28/59	12/7/59	12/21/59	1/26/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	9:00 am	10:00 am	9:15 am	9:30 am
Temperature of stream: °F	--	39	45	39°F	39
Discharge (cfs)	130	10	128	119	406
Spec. cond. micromhos @ 25° C (field)	--	1,250	760	900	--
Spec. cond. micromhos @ 25° C (lab.)	1260	1060	800	1100	1010
pH	7.7	7.2	7.4	7.7	8.1
Turbidity, Jackson units	--	< 25	< 25	< 25	--
Dissolved solids*	*** 783	740	520	710	630
Boron (B)	0.26	0.32	0.18	0.58	0.19
Calcium (Ca)	105	95	64	88	82
Magnesium (Mg)	36	16	22	29	26
Total Hardness ($CaCO_3$)	410	885	250	340	310
Sodium (Na)	(Na+K) 124	130	73	98	(Na+K) 96
Potassium (K)	--	6.0	5.9	6.7	--
Chloride (Cl)	160	135	85	100	122
Sulfate(SO_4)	188	170	120	200	175
Alkalinity ($CaCO_3$)	256	240	150	200	162
Nitrate (N)	0.02	0.2	--	--	0.3
Silica(SiO_2)	16.0	16.8	10.0	12.2	1.5
Fluoride (F)	0.7	0.5	0.7	0.68	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

** Analytical results expressed as parts per million except as noted.

*** Sum of constituents.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 762
Location: North Canadian River below Lake Overholser, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	2/23/60	3/28/60	4/4/60	5/26/60	6/27/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:40 am	9:30 am	11:15 am	8:30 am	3:25 pm
Temperature of stream: °F	37	58	75	--	88
Discharge (cfs)	180	300	302	9	8
Spec. cond. micromhos @ 25° C (field)	1100	1000	1050	--	1150
Spec. cond. micromhos @ 25° C (lab.)	1000	1030	1080	930	1100
pH	8.4	7.5	7.9	7.8	7.8
Turbidity, Jackson units	65	< 25	--	32	29
Dissolved solids*	630	720	740	625	715
Boron (B)	0.21	0.33	0.31	0.05	0.2
Calcium (Ca)	76	92	112	76	88
Magnesium (Mg)	32	22	22	29	32
Total Hardness ($CaCO_3$)	320	320	370	310	350
Sodium (Na)	85	119	103	95	105
Potassium (K)	6.2	8.0	6.5	6.6	5.3
Chloride (Cl)	90	120	120	110	140
Sulfate(SO_4)	180	180	200	150	155
Alkalinity ($CaCO_3$)	170	190	180	210	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.2	10.0	9.6	7.8	8.4
Fluoride (F)	0.8	0.7	0.66	0.45	0.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 762
Location: North Canadian River below Lake Overholser, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	7/25/60	8/15/60	9/21/60	10-17-60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:45 pm	11:00 am	2:45 pm	10:10 am	10:45 am
Temperature of stream: °F	91	83	79	65	57
Discharge (cfs)	9.9	9.3	4.4	9	114
Spec. cond. micromhos @ 25° C (field)	800	900	760	1130	1170
Spec. cond. micromhos @ 25° C (lab.)	730	930	870	1080	1320
pH	7.8	8.2	8.3	7.7	7.5
Turbidity, Jackson units	42	25	< 25	< 25	25
Dissolved solids*	530	674	610	665	740
Boron (B)	0.18	0.22	0.17	0.17	0.14
Calcium (Ca)	53	76	72	72	92
Magnesium (Mg)	24	39	34	44	29
Total Hardness ($CaCO_3$)	230	350	320	360	350
Sodium (Na)	69	87	80	90	88
Potassium (K)	10.0	6.2	5.8	6.2	5.9
Chloride (Cl)	92	120	130	180	135
Sulfate(SO_4)	115	150	148	180	185
Alkalinity ($CaCO_3$)	144	268	184	188	212
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.7	8.2	9.7	10.0	11.9
Fluoride (F)	0.8	0.8	0.5	0.9	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSIS

PHS Station No.: 762
Location: North Canadian River below Lake Overholser, Oklahoma
Basin: Arkansas River
Tributary to: Canadian River

Date collected:	12/27/60	1/19/61	1/23/61	2/13/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	10:30 am	10:10 am	10:05 am	10:15 am	12:00 N
Temperature of stream: °F	40	37	37	49	57
Discharge (cfs)	4.4	82	52	183	105
Spec. cond. micromhos @ 25° C (field)	1100	--	1190	1090	1320
Spec. cond. micromhos @ 25° C (lab.)	945	1010	1275	1180	1400
pH	7.6	8.1	7.65	7.7	7.6
Turbidity, Jackson units	--	--	--	<25	--
Dissolved solids*	575	575	856	706	858
Boron (B)	0.15	0.54	0.01	0.08	0.12
Calcium (Ca)	64	69	88	84	96
Magnesium (Mg)	85	31	39	34	44
Total Hardness ($CaCO_3$)	512	300	380	350	420
Sodium (Na)	71	(Na+K) 92	108	90	135
Potassium (K)	5.5	--	6.5	7.4	6.2
Chloride (Cl)	105	115	154	134	182
Sulfate(SO_4)	140	140	205	45	190
Alkalinity ($CaCO_3$)	168	190	204	180	220
Nitrate (N)	--	.2	--	--	--
Silica(SiO_2)	10.0	11.0	7.7	7.0	9.5
Fluoride (F)	0.76	0.7	0.93	0.70	0.60

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 762
Location: North Canadian River below Lake Overholser, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/10/61	4/17/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	10:00 am	10:00 am	9:10 am		
Temperature of stream: °F	50	58	67		
Discharge (cfs)	342	85	430		
Spec. cond. micromhos @ 25° C (field)	--	1250	1280		
Spec. cond. micromhos @ 25° C (lab.)	1200	1291	1360		
pH	8.0	7.8	7.8		
Turbidity, Jackson units	--	< 25	47		
Dissolved solids*	727	846	819		
Boron (B)	0.48	0.095	0.12		
Calcium (Ca)	85	92	100		
Magnesium (Mg)	36	39	34		
Total Hardness ($CaCO_3$)	360	390	390		
Sodium (Na)	115	120	155		
Potassium (K)	--	5.8	6.9		
Chloride (Cl)	150	154	178		
Sulfate(SO_4)	214	220	220		
Alkalinity ($CaCO_3$)	174	184	176		
Nitrate (N)	0.1	--	--		
Silica(SiO_2)	8.0	9.5	8.1		
Fluoride (F)	0.7	0.60	0.92		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 368
Location: Canadian River at Calvin, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/26/59	12/7/59	12/21/59	1/28/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	11:35 am	9:30 am	2:00 pm	3:35 pm	11:55 am
Temperature of stream: °F	--	--	46	45	38
Discharge (cfs)	342	300	8,540	1,380	1,160
Spec. cond. micromhos @ 25° C (field)	--	1,500	900	2,000	--
Spec. cond. micromhos @ 25° C (lab.)	2,510	1,550	1,080	1,850	1,920
pH	7.8	7.9	8.8	7.9	8.2
Turbidity, Jackson units	--	70	4,000	1,250	--
Dissolved solids*	1,440	1,040	765	1,130	1,140
Boron (B)	0.31	0.16	0.08	0.15	.31
Calcium (Ca)	126	190	82	120	122
Magnesium (Mg)	57	Trace	42	44	40
Total Hardness ($CaCO_3$)	550	475	380	480	470
Sodium (Na)	329	190	105	200	(Na+K) 232
Potassium (K)	--	5	4.8	4.8	--
Chloride (Cl)	625	290	150	340	395
Sulfate(SO_4)	151	150	160	150	145
Alkalinity ($CaCO_3$)	227	280	200	320	262
Nitrate (N)	0.25	--	--	--	.9
Silica(SiO_2)	10	10.8	10.0	11.8	2.5
Fluoride (F)	0.3	0.5	0.7	0.50	.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 368
Location: Canadian River at Calvin, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/25/60	2/17/60	3/30/60	4/6/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	8:50 am	3:45 pm	8:40 am	1:20 pm	7:50 am
Temperature of stream: °F	32	85	51	70	79
Discharge (cfs)	890	--	580	468	402
Spec. cond. micromhos @ 25° C (field)	2,500	1,200	1,750	1,850	2,180
Spec. cond. micromhos @ 25° C (lab.)	2,000	1,160	1,900	1,750	2,450
pH	8.2	7.9	7.7	7.8	7.7
Turbidity, Jackson units	450	182	175	--	900
Dissolved solids*	1,346	724	1,240	1,221	1,550
Boron (B)	0.14	.087	0.11	0.11	0.3
Calcium (Ca)	116	84	140	120	116
Magnesium (Mg)	75	27	52	56	56
Total Hardness ($CaCO_3$)	600	320	480	530	520
Sodium (Na)	215	128	160	187	400
Potassium (K)	4.8	4.6	5.4	6.7	6.4
Chloride (Cl)	410	200	430	300	630
Sulfate(SO_4)	160	53	140	233	95
Alkalinity ($CaCO_3$)	270	210	230	220	215
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	7.0	9.7	10.2	10.6	11.9
Fluoride (F)	0.6	0	0.8	0.40	0.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 368
Location: Canadian River at Calvin, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/27/60	8/18/60	9/21/60	10/19/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:10 am	11:15 am	10:45 am	8:20 am	2:45 pm
Temperature of stream: °F	82	77	76	61	68
Discharge (cfs)	4,330	3,460	160	9,620	306
Spec. cond. micromhos @ 25° C (field)	650	1,175	1,620	620	1,280
Spec. cond. micromhos @ 25° C (lab.)	700	--	1,570	790	1,530
pH	7.6	--	7.8	7.2	7.6
Turbidity, Jackson units	1,900	> 5,000	215	> 5,000	500
Dissolved solids*	454	--	1,055	430	925
Boron (B)	0.15	0.23	0.25	0.15	0.16
Calcium (Ca)	61	--	80	69	100
Magnesium (Mg)	16	--	44	15	34
Total Hardness ($CaCO_3$)	220	--	380	236	390
Sodium (Na)	79	--	175	69	165
Potassium (K)	3.8	--	5.8	4.1	5.3
Chloride (Cl)	105	205	345	105	260
Sulfate(SO_4)	70	180	155	65	150
Alkalinity ($CaCO_3$)	112	--	158	196	244
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.7	13.6	8.5	9.7	10.4
Fluoride (F)	0.7	--	0.7	0.6	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 368
Location: Canadian River at Calvin, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/27/60	1/10/61	1/23/61	2/15/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	3:15 pm	4:00 pm	2:00 pm	12:15 pm	3:45 pm
Temperature of stream: °F	39	43	42	56	61
Discharge (cfs)	728	660	366	4,140	525
Spec. cond. micromhos @ 25° C (field)	1,830	--	1,920	1,650	1,930
Spec. cond. micromhos @ 25° C (lab.)	2,073	1,760	1,950	1,570	1,850
pH	7.4	8.3	7.5	7.4	7.9
Turbidity, Jackson units	--	--	--	< 5,000	430
Dissolved solids*	1,089	1,090	1,161	1,060	1,137
Boron (B)	.15	.29	.17	.17	.09
Calcium (Ca)	104	115	124	124	100
Magnesium (Mg)	49	47	44	46	46
Total Hardness ($CaCO_3$)	460	480	490	500	440
Sodium (Na)	215	192	215	155	215
Potassium (K)	4.9	--	4.9	6.8	4.4
Chloride (Cl)	340	320	375	220	335
Sulfate(SO_4)	165	178	210	285	232
Alkalinity ($CaCO_3$)	244	259	256	256	164
Nitrate (N)	--	.3	--	--	--
Silica(SiO_2)	10.0	11.	9.0	8.6	10.7
Fluoride (F)	.76	.5	.11	.90	1.07

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 368
Location: Canadian River at Calvin, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/10/61	4/17/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	3:00 pm	1:30 pm	4:15 pm		
Temperature of stream: °F	57	63	78		
Discharge (cfs)	2,425	747	340		
Spec. cond. micromhos @ 25° C (field)	--	1,960	1,800		
Spec. cond. micromhos @ 25° C (lab.)	1,750	1,827	1,790		
pH	8.0	7.6	7.85		
Turbidity, Jackson units	--	> 5,000	320		
Dissolved solids*	1,040	1,140	1,066		
Boron (B)	.41	.115	.13		
Calcium (Ca)	91	112	100		
Magnesium (Mg)	42	46	44		
Total Hardness ($CaCO_3$)	400	470	430		
Sodium (Na)	219	220	210		
Potassium (K)	--	4.6	5.3		
Chloride (Cl)	385	355	335		
Sulfate(SO_4)	110	180	160		
Alkalinity ($CaCO_3$)	217	232	152		
Nitrate (N)	.3	--	--		
Silica(SiO_2)	9.0	9.9	8.3		
Fluoride (F)	.5	.81	.76		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 367
Location: Little River near Sasakwa, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	10/26/59	12/7/59	12/21/59	1/28/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	10:45 am	8:40 am	12:45 pm	4:30 pm	12:50 pm
Temperature of stream: °F	--	--	46	43	38
Discharge (cfs)	87	80	579	280	280
Spec. cond. micromhos @ 25° C (field)	--	4,000	1,050	3,600	--
Spec. cond. micromhos @ 25° C (lab.)	4,930	4,000	1,100	3,000	3,860
pH	8.0	7.7	7.5	7.6	8.1
Turbidity, Jackson units	--	< 25	500	220	--
Dissolved solids*	2,630	2,780	750	2,420	2,270
Boron (B)	0.35	0.12	0.18	0.16	.16
Calcium (Ca)	186	300	68	340	184
Magnesium (Mg)	113	TR	27	138	78
Total Hardness ($CaCO_3$)	930	745	280	1,500	780
Sodium (Na)	661	590	130	156	(Na+K) 511
Potassium (K)	--	7	4.6	5.5	--
Chloride (Cl)	1,450	1,200	290	190	1,100
Sulfate(SO_4)	36	40	20	1,250	33
Alkalinity ($CaCO_3$)	284	260	140	160	305
Nitrate (N)	0.18	--	--	--	.0
Silica(SiO_2)	9.0	12.0	8.2	16.6	10.
Fluoride (F)	0.1	0.2	0.6	0.42	0.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 367
Location: Little River near Sasakwa, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	2/25/60	3/30/60	4/6/60	5/26/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:00 am	9:30 am	3:00 pm	5:40 pm	10:00 am
Temperature of stream: °F	32.5	59	69	81	84
Discharge (cfs)	164	162	107	538	91
Spec. cond. micromhos @ 25° C (field)	3,700	3,500	3,600	2,050	1,800
Spec. cond. micromhos @ 25° C (lab.)	3,000	3,500	3,600	2,150	1,550
pH	8.1	7.8	8.1	7.9	7.8
Turbidity, Jackson units	< 25	< 25	--	308	220
Dissolved solids*	1,914	2,030	2,322	1,338	935
Boron (B)	0.20	0.16	0.18	0.08	0.3
Calcium (Ca)	108	144	136	100	76
Magnesium (Mg)	73	85	80	46	49
Total Hardness (CaCO$_3$)	610	710	670	440	390
Sodium (Na)	450	525	465	275	190
Potassium (K)	4.5	5.7	2.7	4.6	3.8
Chloride (Cl)	800	1,080	1,020	530	410
Sulfate(SO$_4$)	35	40	50	22	26
Alkalinity (CaCO$_3$)	250	270	280	230	200
Nitrate (N)	--	--	--	--	--
Silica(SiO$_2$)	9.0	6.3	8.2	10.0	8.5
Fluoride (F)	0.4	0.8	0.36	0.33	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 367
Location: Little River near Sasakwa, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	7/28/60	8/18/60	9/21/60	10/19/60	11/14/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	--	2:25 pm	11:55 am	9:45 am	--
Temperature of stream: °F	83	83	80	61	64
Discharge (cfs)	--	59	25	1,240	48
Spec. cond. micromhos @ 25° C (field)	--	2,950	3,200	1,050	3,700
Spec. cond. micromhos @ 25° C (lab.)	403	--	2,700	1,000	3,550
pH	7.3	--	8.0	7.2	8.0
Turbidity, Jackson units	--	< 25	25	> 5,000	< 25
Dissolved solids*	235	--	1,785	550	2,070
Boron (B)	0.09	0.29	0.26	0.10	0.20
Calcium (Ca)	26	--	128	41	124
Magnesium (Mg)	13	--	63	32	70
Total Hardness ($CaCO_3$)	120	--	580	232	600
Sodium (Na)	36	--	365	116	440
Potassium (K)	--	--	5.8	3.5	6.5
Chloride (Cl)	69	850	900	260	1,025
Sulfate(SO_4)	7.8	34	38	15	35
Alkalinity ($CaCO_3$)	92	--	220	92	224
Nitrate (N)	.1	--	--	--	--
Silica(SiO_2)	6.5	8.8	7.8	7.3	18.8
Fluoride (F)	0.3	--	1.0	0.5	0.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 367
Location: Little River near Sasakwa, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	12/27/60	1/11/61	1/23/61	2/15/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	1:50 pm	9:55 am	12:10 pm	2:25 pm	2:20 pm
Temperature of stream: °F	38	37	37	58	60
Discharge (cfs)	101	98	71	86	88
Spec. cond. micromhos @ 25° C (field)	3,200	--	3,900	2,800	3,700
Spec. cond. micromhos @ 25° C (lab.)	3,910	3,350	3,600	2,560	3,560
pH	7.4	8.2	7.4	7.5	7.65
Turbidity, Jackson units	--	--	--	> 25	< 25
Dissolved solids*	1,733	2,080	1,994	1,497	2,078
Boron (B)	.2	.74	.195	.17	.205
Calcium (Ca)	128	146	128	104	132
Magnesium (Mg)	68	76	85	63	80
Total Hardness ($CaCO_3$)	600	675	670	520	660
Sodium (Na)	356	(Na+K) 454	481	285	430
Potassium (K)	5.3	--	5.5	4.9	5.
Chloride (Cl)	840	950	1,050	650	1,050
Sulfate(SO_4)	43	33	47	40	39
Alkalinity ($CaCO_3$)	276	287	248	244	268
Nitrate (N)	--	.0	--	--	--
Silica(SiO_2)	11.	10.	7.3	5.6	7.9
Fluoride (F)	0.37	0.1	0.125	0.24	0.45

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 367
Location: Little River near Sasakwa, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	4/10/61	4/17/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	1:50 pm	11:50 am	3:10 pm		
Temperature of stream: °F	51	59	75		
Discharge (cfs)	314	149	116		
Spec. cond. micromhos @ 25° C (field)	--	3,450	4,200		
Spec. cond. micromhos @ 25° C (lab.)	1,680	3,270	4,300		
pH	8.1	7.5	7.8		
Turbidity, Jackson units	--	> 25	51		
Dissolved solids*	1,020	1,901	2,453		
Boron (B)	.35	.15	.20		
Calcium (Ca)	83	136	156		
Magnesium (Mg)	51	75	85		
Total Hardness ($CaCO_3$)	415	650	740		
Sodium (Na)	184	400	540		
Potassium (K)	--	4.6	7.3		
Chloride (Cl)	398	850	1,200		
Sulfate(SO_4)	23	37	36		
Alkalinity ($CaCO_3$)	230	248	232		
Nitrate (N)	0.1	--	--		
Silica(SiO_2)	8.4	9.0	8.3		
Fluoride (F)	0.4	0.44	0.50		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 763
Location: Salt Creek of Little River near DeWright, Oklahoma
Basin: Arkansas River
Tributary to: Little River

Date collected:	10/26/59	12/7/59	12/21/59	1/28/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	8:05 am	11:50 am	5:10 pm	1:20 pm
Temperature of stream: °F	--	--	44	45	39
Discharge (cfs)	20	22	71	64	82
Spec. cond. micromhos @ 25° C (field)	--	8,500	4,500	5,000	--
Spec. cond. micromhos @ 25° C (lab.)	11,000	9,000	4,200	6,200	6,440
pH	7.5	7.6	7.7	7.6	8.1
Turbidity, Jackson units	--	< 25	25	< 25	--
Dissolved solids*	6,200	6,870	2,833	3,910	4,180
Boron (B)	0.18	0.22	0.24	0.33	0.29
Calcium (Ca)	121	390	196	186	280
Magnesium (Mg)	142	135	85	142	112
Total Hardness (CaCO$_3$)	1,700	1,520	840	1,050	1,160
Sodium (Na)	1,730	1,700	1,000	960	(Na+K) 1,010
Potassium (K)	--	150	7.8	8.9	--
Chloride (Cl)	3,670	3,100	1,430	2,000	2,150
Sulfate(SO$_4$)	59	85	40	55	54
Alkalinity (CaCO$_3$)	230	260	240	260	259
Nitrate (N)	0.29	--	--	--	0.3
Silica(SiO$_2$)	10.0	9.6	13.4	12.6	10.0
Fluoride (F)	0.00	0.4	0.4	0.28	0.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 763
Location: Salt Creek of Little River near DeWright, Oklahoma
Basin: Arkansas River
Tributary to: Little River

Date collected:	2/25/60	3/30/60	4/6/60	5/27/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:40 am	10:40 am	4:00 pm	2:00 pm	12:00 N
Temperature of stream: °F	32.5	55	77	85	88
Discharge (cfs)	28	28	29	72	--
Spec. cond. micromhos @ 25° C (field)	7,000	6,500	7,400	5,000	2,610
Spec. cond. micromhos @ 25° C (lab.)	5,800	6,800	8,000	5,800	2,400
pH	7.7	7.8	7.9	7.8	8.1
Turbidity, Jackson units	< 25	< 25	--	< 25	< 25
Dissolved solids*	3,422	4,600	4,920	3,585	2,100
Boron (B)	0.16	0.20	0.20	0.14	0.45
Calcium (Ca)	200	236	264	195	352
Magnesium (Mg)	120	136	151	105	136
Total Hardness ($CaCO_3$)	1,000	1,150	1,280	920	1,230
Sodium (Na)	1,100	1,150	1,250	900	1,350
Potassium (K)	7.5	3.7	3.8	8.3	12.1
Chloride (Cl)	1,800	2,430	265	1,700	2,640
Sulfate(SO_4)	25	50	55	38	50
Alkalinity ($CaCO_3$)	250	250	250	230	160
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	10.4	9.2	3.2	11.0	8.4
Fluoride (F)	0.4	0.8	0.36	0.3	0.10

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 763
Location: Salt Creek of Little River near DeWright, Oklahoma
Basin: Arkansas River
Tributary to: Little River

Date collected:	6/29/60	7/27/60	8/18/60	9/21/60	10/19/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:40 am	12:15 pm	3:35 pm	1:00 pm	10:30 am
Temperature of stream: °F	83	85	78	80	59
Discharge (cfs)	4.3	55	512	5.9	478
Spec. cond. micromhos @ 25° C (field)	8,000	2,600	2,200	18,250	920
Spec. cond. micromhos @ 25° C (lab.)	8,000	2,500	1,920	16,000	900
pH	7.7	7.5	8.0	7.6	7.2
Turbidity, Jackson units	< 25	121	> 5,000	< 25	> 5,000
Dissolved solids*	5,100	1,635	1,110	10,520	500
Boron (B)	0.3	0.08	0.13	0.64	0.12
Calcium (Ca)	264	100	84	516	38
Magnesium (Mg)	131	49	44	23	23
Total Hardness ($CaCO_3$)	1,200	450	390	2,250	160
Sodium (Na)	1,275	413	290	2,875	105
Potassium (K)	11.2	5.2	3.1	3.5	3.2
Chloride (Cl)	2,750	810	595	6,350	225
Sulfate(SO_4)	40	16	20	98	14
Alkalinity ($CaCO_3$)	160	102	120	96	72
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	6.9	6.9	7.5	5.8	4.9
Fluoride (F)	0.6	0.4	0.4	0.5	0.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 763
Location: Salt Creek of Little River near DeWright, Oklahoma
Basin: Arkansas River
Tributary to: Little River

Date collected:	11/14/60	12/27/60	1/11/61	1/23/61	2/15/61
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	12:30 pm	1:00 pm	10:25 am	11:20 am	3:00 pm
Temperature of stream: °F	62	39	36	36	61
Discharge (cfs)	11	20	26	22	15
Spec. cond. micromhos @ 25° C (field)	9,750	7,100	--	8,700	7,900
Spec. cond. micromhos @ 25° C (lab.)	8,750	6,430	6,740	7,750	7,400
pH	7.4	7.2	7.9	7.3	7.3
Turbidity, Jackson units	< 25	--	--	--	> 25
Dissolved solids*	5,360	3,884	4,230	4,734	4,295
Boron (B)	0.38	0.27	2.2	0.28	0.33
Calcium (Ca)	280	224	240	256	224
Magnesium (Mg)	158	121	132	160	155
Total Hardness ($CaCO_3$)	1,350	1,060	1,140	1,300	1,200
Sodium (Na)	1,415	913	100	1,225	1,038
Potassium (K)	12.5	9.0	--	9.8	10.2
Chloride (Cl)	2,975	2,150	2,100	2,700	2,400
Sulfate(SO_4)	64	56	62	57	75
Alkalinity ($CaCO_3$)	120	216	295	216	184
Nitrate (N)	--	--	0.1	--	--
Silica(SiO_2)	8.4	9.6	11.0	10.4	5.2
Fluoride (F)	0.3	0.43	0.1	0.17	0.39

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 763
Location: Salt Creek of Little River near DeWright, Oklahoma
Basin: Arkansas River
Tributary to: Little River

Date collected:	3/13/61	4/10/61	4/17/61	5/15/61	
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	
Time of collection:	1:35 pm	1:05 pm	11:10 am	2:20 pm	
Temperature of stream: °F	57	53	57	75	
Discharge (cfs)	19	96	41	32	
Spec. cond. micromhos @ 25° C (field)	8,050	--	5,900	6,600	
Spec. cond. micromhos @ 25° C (lab.)	7,700	2,980	5,760	6,450	
pH	7.4	8.3	7.4	7.35	
Turbidity, Jackson units	< 25	--	> 25	> 25	
Dissolved solids*	4,565	1,860	3,395	3,786	
Boron (B)	0.11	0.31	0.44	0.29	
Calcium (Ca)	260	131	204	224	
Magnesium (Mg)	134	63	104	112	
Total Hardness ($CaCO_3$)	1,200	585	240	1,020	
Sodium (Na)	1,063	396	663	875	
Potassium (K)	10.5	--	7.0	9.0	
Chloride (Cl)	2,575	850	1,725	2,000	
Sulfate(SO_4)	58	29	43	67	
Alkalinity ($CaCO_3$)	212	217	216	216	
Nitrate (N)	--	0.1	--	--	
Silica(SiO_2)	6.2	9.0	--	7.7	
Fluoride (F)	0.60	0.3	--	0.55	

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 366
Location: Little River near Tecumseh, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	10/26/59	12/9/59	12/21/59	1/28/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	9:15 am	10:00 am	10:45 am	6:10 pm	2:10 pm
Temperature of stream: °F	--	--	41	43	44
Discharge (cfs)	37	42	95	105	165
Spec. cond. micromhos @ 25° C (field)	--	925	610	1,150	--
Spec. cond. micromhos @ 25° C (lab.)	986	940	650	800	941
pH	8.2	8.1	7.9	8.1	8.2
Turbidity, Jackson units	--	30	110	45	--
Dissolved solids*	549	570	430	490	541
Boron (B)	0.35	0.38	0.24	0.25	0.15
Calcium (Ca)	46	50	62	49	77
Magnesium (Mg)	57	61	8.5	37	52
Total Hardness ($CaCO_3$)	350	360	290	292	405
Sodium (Na)	82	100	43	70	(Na+K) 49
Potassium (K)	--	2.0	4.3	2.5	--
Chloride (Cl)	130	115	140	110	114
Sulfate(SO_4)	35	30	15	40	26
Alkalinity ($CaCO_3$)	307	210	250	260	325
Nitrate (N)	0.16	< 0.1	--	--	0.0
Silica(SiO_2)	14.0	14.8	10.4	14.2	8.0
Fluoride (F)	0.3	0.1	0.4	0.40	0.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 366
Location: Little River near Tecumseh, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	2/25/60	3/30/60	4/6/60	5/29/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:45 am	12:30 pm	4:40 pm	5:15 pm	11:30 am
Temperature of stream: °F	32	59	69	84	88
Discharge (cfs)	100	62	50	263	46
Spec. cond. micromhos @ 25° C (field)	1,300	880	1,090	820	840
Spec. cond. micromhos @ 25° C (lab.)	1,000	900	1,030	800	800
pH	8.2	8.1	8.2	8.1	7.8
Turbidity, Jackson units	80	< 25	--	305	30
Dissolved solids*	641	580	617	482	480
Boron (B)	0.24	0.29	0.30	0.13	0.3
Calcium (Ca)	64	60	68	104	56
Magnesium (Mg)	58	51	51	19	44
Total Hardness ($CaCO_3$)	400	360	380	340	320
Sodium (Na)	50	79	82	55	63
Potassium (K)	2.0	2.2	4.0	3.1	2.5
Chloride (Cl)	100	100	130	70	112
Sulfate(SO_4)	35	28	48	25	26
Alkalinity ($CaCO_3$)	280	310	330	290	256
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	13.0	13.0	11.9	12.2	11.2
Fluoride (F)	0.5	0.8	0.36	0.45	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 366
Location: Little River near Tecumseh, Oklahoma
Basin: Arkansas River
Tributary to: South Canadian River

Date collected:	7/28/60	8/19/60	9/21/60	10/19/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:15 am	10:20 am	2:30 pm	1:40 pm	11:40 am
Temperature of stream: °F	76	80	82	56	63
Discharge (cfs)	338	77	21	252	28
Spec. cond. micromhos @ 25° C (field)	280	440	1,100	360	1,050
Spec. cond. micromhos @ 25° C (lab.)	280	--	900	350	1,000
pH	7.9	--	8.2	7.2	7.8
Turbidity, Jackson units	> 5,000	800	132	> 5,000	< 25
Dissolved solids*	170	--	565	165	525
Boron (B)	0.16	0.20	0.40	0.12	0.13
Calcium (Ca)	24	--	48	32	64
Magnesium (Mg)	13	--	27	14	41
Total Hardness ($CaCO_3$)	116	--	330	136	330
Sodium (Na)	16	--	100	15	73
Potassium (K)	3.2	--	2.5	4.0	2.7
Chloride (Cl)	30	40	165	22	130
Sulfate(SO_4)	12	20	55	15	45
Alkalinity ($CaCO_3$)	102	--	248	132	312
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	8.8	7.0	9.7	8.6	12.8
Fluoride (F)	0.2	--	0.5	0.4	0.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	366
Location:	Little River near Tecumseh, Oklahoma
Basin:	Arkansas River
Tributary to:	South Canadian River

Date collected:	12/27/60	1/11/61	1/23/61	2/15/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	11:20 am	11:25 am	10:20 am	4:20 pm	10:50 am
Temperature of stream: °F	36	36	33	65	55
Discharge (cfs)	42	45	44	41	48
Spec. cond. micromhos @ 25° C (field)	920	--	990	960	990
Spec. cond. micromhos @ 25° C (lab.)	1,000	959	935	910	990
pH	7.6	8.4	7.7	7.7	7.80
Turbidity, Jackson units	--	--	--	> 25	< 25
Dissolved solids*	470	563	564	593	510
Boron (B)	0.10	1.0	0.21	0.3	0.155
Calcium (Ca)	60	67	56	104	56
Magnesium (Mg)	41	54	53	12	46
Total Hardness ($CaCO_3$)	320	390	360	310	330
Sodium (Na)	60	(Na+K) 58	63	60	60
Potassium (K)	2.0	--	1.8	2.5	1.3
Chloride (Cl)	95	112	115	115	120
Sulfate(SO_4)	37	31	41	39	38
Alkalinity ($CaCO_3$)	288	325	300	388	236
Nitrate (N)	--	0.0	--	--	--
Silica(SiO_2)	13.2	14.0	11.7	7.4	10.6
Fluoride (F)	0.43	0.1	0.135	0.29	0.45

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.:	366
Location:	Little River near Tecumseh, Oklahoma
Basin:	Arkansas River
Tributary to:	South Canadian River

Date collected:	4/10/61	4/17/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	11:50 am	10:15 am	12:30 pm		
Temperature of stream: °F	51	55	74		
Discharge (cfs)	207	69	40		
Spec. cond. micromhos @ 25° C (field)	--	950	950		
Spec. cond. micromhos @ 25° C (lab.)	692	854	928		
pH	8.1	7.7	8.0		
Turbidity, Jackson units	--	> 25	47		
Dissolved solids*	384	499	546		
Boron (B)	0.37	0.175	0.26		
Calcium (Ca)	56	64	52		
Magnesium (Mg)	37	39	51		
Total Hardness ($CaCO_3$)	290	320	340		
Sodium (Na)	40	60	70		
Potassium (K)	--	2.1	2.5		
Chloride (Cl)	64	95	115		
Sulfate(SO_4)	19	34	40		
Alkalinity ($CaCO_3$)	266	300	276		
Nitrate (N)	0.0	--	--		
Silica(SiO_2)	10.0	12.3	11.4		
Fluoride (F)	0.4	0.55	0.50		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 838
Location: Canadian River at Purcell, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	** 10/26/59	12/9/59	12/21/59	1/28/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	9:15 am	9:40 am	7:25 pm	3:00 pm
Temperature of stream: °F	--	--	41	--	45
Discharge (cfs)	--	112	7,410	672	604
Spec. cond. micromhos @ 25° C (field)	--	1,100	1,400	1,550	--
Spec. cond. micromhos @ 25° C (lab.)	1,420	1,120	1,550	1,800	1,730
pH	7.7	7.7	7.8	7.8	8.0
Turbidity, Jackson units	--	< 25	5,000	1,750	--
Dissolved solids*	932	910	1,130	1,140	1,110
Boron (B)	0.32	0.26	0.23	0.20	0.22
Calcium (Ca)	118	130	114	124	136
Magnesium (Mg)	48	47	33	49	37
Total Hardness ($CaCO_3$)	490	515	420	510	490
Sodium (Na)	128	110	195	175	(Na+K) 203
Potassium (K)	--	3.0	5.7	5.5	5.7
Chloride (Cl)	115	70	290	200	255
Sulfate(SO_4)	393	220	140	350	309
Alkalinity ($CaCO_3$)	192	270	220	240	246
Nitrate (N)	0.84	--	--	--	0.3
Silica(SiO_2)	10.0	12.8	11.2	12.0	10.0
Fluoride (F)	0.5	0.3	1.0	0.70	0.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

**Analytical results expressed as parts per million except as noted (column 1 only)

CHEMICAL ANALYSES

PHS Station No.: 838
Location: Canadian River at Purcell, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/25/60	3/30/60	4/7/60	5/29/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	--	2:10 pm	9:00 am	3:15 pm	1:00 pm
Temperature of stream: °F	34	64	76	84	87
Discharge (cfs)	100	184	97	130	135
Spec. cond. micromhos @ 25° C (field)	2,200	1,350	1,820	1,100	1,120
Spec. cond. micromhos @ 25° C (lab.)	1,800	1,530	1,630	1,100	1,200
pH	8.1	7.7	7.6	7.7	7.5
Turbidity, Jackson units	220	180	--	32	550
Dissolved solids*	1,311	1,150	1,264	812	778
Boron (B)	0.21	0.14	0.10	0.2	0.2
Calcium (Ca)	144	124	164	92	80
Magnesium (Mg)	70	60	53	46	32
Total Hardness ($CaCO_3$)	650	560	360	420	330
Sodium (Na)	175	250	142	99	130
Potassium (K)	5.9	5.9	4.4	5.0	6.2
Chloride (Cl)	220	150	150	65	170
Sulfate(SO_4)	350	360	465	270	150
Alkalinity ($CaCO_3$)	330	180	220	240	196
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.6	12.6	12.3	10.0	10.3
Fluoride (F)	0.8	0.7	0.45	0.34	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 838
Location: Canadian River at Purcell, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/26/60	8/19/60	9/21/60	10/19/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:45 pm	8:25 am	3:40 pm	3:00 pm	10:30 am
Temperature of stream: °F	92	76	79	55	62
Discharge (cfs)	1,310	1,840	331	8,430	170
Spec. cond. micromhos @ 25° C (field)	1,210	1,050	1,850	510	1,580
Spec. cond. micromhos @ 25° C (lab.)	1,220	--	1,900	710	1,550
pH	7.8	--	7.9	7.3	7.4
Turbidity, Jackson units	> 5,000	> 5,000	530	> 5,000	450
Dissolved solids*	860	--	1,145	390	965
Boron (B)	0.18	0.20	0.27	0.10	0.23
Calcium (Ca)	84	--	104	75	116
Magnesium (Mg)	41	--	41	14	39
Total Hardness ($CaCO_3$)	380	--	430	248	450
Sodium (Na)	188	--	220	64	165
Potassium (K)	6.8	--	7.0	4.4	5.8
Chloride (Cl)	202	170	350	65	190
Sulfate(SO_4)	180	175	190	100	275
Alkalinity ($CaCO_3$)	232	--	160	168	236
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	13.2	12.8	9.7	10.5	11.4
Fluoride (F)	1.0	--	0.7	0.6	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 838
Location: Canadian River at Purcell, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/27/60	1/11/61	1/23/61	2/15/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	10:30 am	12:25 pm	9:20 am	5:45 pm	10:40 am
Temperature of stream: °F	36	40	32	62	50
Discharge (cfs)	940	239	430	986	286
Spec. cond. micromhos @ 25° C (field)	1,800	--	1,900	1,800	2,010
Spec. cond. micromhos @ 25° C (lab.)	1,911	1,750	1,880	1,660	2,010
pH	7.3	8.3	7.6	7.75	7.0
Turbidity, Jackson units	--	--	--	< 5,000	850
Dissolved solids*	1,145	1,130	1,203	1,077	1,292
Boron (B)	0.18	0.69	0.21	0.17	0.16
Calcium (Ca)	160	123	132	116	120
Magnesium (Mg)	24	47	44	32	46
Total Hardness ($CaCO_3$)	500	500	510	420	490
Sodium (Na)	216	198	207	205	260
Potassium (K)	4.9	--	5.5	6.8	5.0
Chloride (Cl)	285	250	275	285	300
Sulfate(SO_4)	287	311	350	300	405
Alkalinity ($CaCO_3$)	228	249	240	184	220
Nitrate (N)	--	0.7	--	--	--
Silica(SiO_2)	10.4	10.0	10.4	7.1	10.6
Fluoride (F)	0.81	0.7	0.135	0.85	1.07

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 838
Location: Canadian River at Purcell, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/10/61	4/17/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	10:50 am	9:20 am	11:15 am		
Temperature of stream: °F	49	52	66.5		
Discharge (cfs)	500	277	33		
Spec. cond. micromhos @ 25° C (field)	--	1,850	1,750		
Spec. cond. micromhos @ 25° C (lab.)	1,660	1,776	1,800		
pH	8.1	7.7	7.65		
Turbidity, Jackson units	--	320	250		
Dissolved solids*	1,060	1,193	1,187		
Boron (B)	0.45	0.24	0.30		
Calcium (Ca)	104	128	124		
Magnesium (Mg)	48	46	51		
Total Hardness ($CaCO_3$)	455	510	520		
Sodium (Na)	204	205	195		
Potassium (K)	--	5.4	6.7		
Chloride (Cl)	255	280	230		
Sulfate(SO_4)	307	395	400		
Alkalinity ($CaCO_3$)	217	224	212		
Nitrate (N)	0.5	--	--		
Silica(SiO_2)	10.0	10.0	12.1		
Fluoride (F)	0.8	1.07	1.02		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 364
Location: Canadian River at Bridgeport, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/28/59	12/7/59	12/21/59	1/26/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	4:15 pm	10:00 am	11:00 am	10:45 am	11:00 am
Temperature of stream: °F	--	39	43	36	40
Discharge (cfs)	61	52	4,400	450	426
Spec. cond. micromhos @ 25° C (field)	--	1,600	1,600	2,000	--
Spec. cond. micromhos @ 25° C (lab.)	1,510	1,340	1,650	1,900	1,880
pH	8.0	7.9	8.0	7.8	8.2
Turbidity, Jackson units	--	< 25	4,000	1,500	--
Dissolved solids*	1,160	1,250	1,200	1,240	1,220
Boron (B)	0.14	0.20	0.22	0.16	.14
Calcium (Ca)	218	230	102	136	138
Magnesium (Mg)	63	50	35	41	43
Total Hardness ($CaCO_3$)	805	775	400	510	520
Sodium (Na)	61	70	230	200	(Na+K) 220
Potassium (K)	--	3	5.9	5.5	--
Chloride (Cl)	40	40	340	240	288
Sulfate(SO_4)	613	420	160	370	356
Alkalinity ($CaCO_3$)	239	240	220	200	218
Nitrate (N)	0.90	1.1	--	--	.5
Silica(SiO_2)	16	18.0	10.1	13.0	10.
Fluoride (F)	0.5	0.4	1.1	0.74	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 364
Location: Canadian River at Bridgeport, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/23/60	3/28/60	4/4/60	5/25/60	7/1/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:45 am	10:40 am	1:00 pm	3:05 pm	8:45 am
Temperature of stream: °F	32	61	75	--	76
Discharge (cfs)	200	163	143	38	34
Spec. cond. micromhos @ 25° C (field)	2,300	1,675	1,550	--	1,400
Spec. cond. micromhos @ 25° C (lab.)	2,200	1,800	1,800	1,260	1,400
pH	8.2	7.9	7.8	7.7	7.6
Turbidity, Jackson units	700	75	--	< 25	110
Dissolved solids*	1,456	1,430	1,331	1,153	1,067
Boron (B)	0.14	0.10	0.10	.125	0.3
Calcium (Ca)	164	192	172	188	155
Magnesium (Mg)	58	68	61	49	47
Total Hardness ($CaCO_3$)	650	760	680	670	580
Sodium (Na)	195	155	150	73	97
Potassium (K)	5.9	5.5	6.3	5.1	5.0
Chloride (Cl)	260	170	180	45	115
Sulfate(SO_4)	525	550	515	520	425
Alkalinity ($CaCO_3$)	220	200	170	200	160
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	13.0	15.2	14.5	14.5	15.0
Fluoride (F)	0.5	0.7	0.66	.65	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 364
Location: Canadian River at Bridgeport, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/25/60	8/18/60	9/21/60	10/17/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:45 am	6:30 pm	12:45 pm	1:30 pm	10:45 am
Temperature of stream: °F	86	81	77	61	59
Discharge (cfs)	974	690	119	88	129
Spec. cond. micromhos @ 25° C (field)	1,300	850	1,660	1,190	1,875
Spec. cond. micromhos @ 25° C (lab.)	1,100	--	1,600	1,160	1,670
pH	7.8	--	8.1	7.8	7.5
Turbidity, Jackson units	> 5,000	> 5,000	500	> 5,000	> 5,000
Dissolved solids*	732	--	1,075	695	1,085
Boron (B)	0.18	0.18	0.21	0.14	0.17
Calcium (Ca)	76	--	100	80	140
Magnesium (Mg)	22	--	34	22	36
Total Hardness ($CaCO_3$)	280	--	390	290	500
Sodium (Na)	150	--	215	138	175
Potassium (K)	2.7	--	6.5	5.0	5.3
Chloride (Cl)	182	140	320	175	215
Sulfate(SO_4)	155	155	255	175	312
Alkalinity ($CaCO_3$)	204	--	146	156	208
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	13.2	11.0	11.1	10.7	13.6
Fluoride (F)	1.0	--	1.0	0.7	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	364
Location:	Canadian River at Bridgeport, Oklahoma
Basin:	Arkansas River
Tributary to:	Arkansas River

Date collected:	12/27/60	1/9/61	1/26/61	2/13/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	12:30 pm	11:35 am	1:00 pm	11:45 am	1:50 pm
Temperature of stream: °F	38	34	32	48	59
Discharge (cfs)	560	193	140	1,410	229
Spec. cond. micromhos @ 25° C (field)	2,000	--	1,700	1,800	2,000
Spec. cond. micromhos @ 25° C (lab.)	2,254	1,920	2,500	1,810	2,200
pH	7.5	8.3	7.5	7.5	7.55
Turbidity, Jackson units	--	--	--	< 5,000	550
Dissolved solids*	1,218	1,280	1,701	1,133	1,331
Boron (B)	.18	.47	.20	.09	.145
Calcium (Ca)	144	144	188	116	140
Magnesium (Mg)	29	49	61	34	46
Total Hardness ($CaCO_3$)	480	560	720	430	540
Sodium (Na)	245	214	275	205	230
Potassium (K)	5.5	--	6.5	6.5	5.5
Chloride (Cl)	315	282	385	310	280
Sulfate(SO_4)	312	378	538	294	437
Alkalinity ($CaCO_3$)	216	230	356	192	220
Nitrate (N)	--	.5	--	--	--
Silica(SiO_2)	11.4	12.	13.6	9.0	16.2
Fluoride (F)	.98	.7	.13	.75	1.12

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 364
Location: Canadian River at Bridgeport, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/12/61	4/17/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	11:45 am	11:50 am	10:30 am		
Temperature of stream: °F	51	61	66		
Discharge (cfs)	470	130	43		
Spec. cond. micromhos @ 25° C (field)	--	2,050	2,250		
Spec. cond. micromhos @ 25° C (lab.)	1,800	1,959	2,170		
pH	8.2	7.4	7.6		
Turbidity, Jackson units	--	102	370		
Dissolved solids*	1,180	1,356	1,676		
Boron (B)	.50	.12	.20		
Calcium (Ca)	126	156	224		
Magnesium (Mg)	47	53	75		
Total Hardness ($CaCO_3$)	505	610	870		
Sodium (Na)	209	215	195		
Potassium (K)	--	5.3	6.4		
Chloride (Cl)	265	285	210		
Sulfate(SO_4)	371	450	750		
Alkalinity ($CaCO_3$)	197	208	216		
Nitrate (N)	.5	--	--		
Silica(SiO_2)	11.	12.5	13.2		
Fluoride (F)	.8	1.12	.92		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 363
Location: Canadian River near Canadian, Texas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	11/3/59	12/29/59	1/26/60	2/16/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	2:15 pm	--	3:05 pm	2:30 pm	4:00 pm
Temperature of stream: °F	64	--	39	50	33
Discharge (cfs)	86	230	798	380	168
Spec. cond. micromhos @ 25° C (field)	--	--	1,950	--	2,800
Spec. cond. micromhos @ 25° C (lab.)	2,410	2,000	1,700	2,350	2,150
pH	8.0	8.0	7.8	8.2	8.1
Turbidity, Jackson units	--	1,200	750	--	300
Dissolved solids*	1,390	1,380	1,070	1,400	1,470
Boron (B)	0.23	0.25	0.12	.09	0.25
Calcium (Ca)	87	108	92	101	108
Magnesium (Mg)	45	36	24	38	46
Total Hardness ($CaCO_3$)	400	420	330	410	460
Sodium (Na)	364	100	235	(Na+K) 346	385
Potassium (K)	--	6.5	6.7	--	7.8
Chloride (Cl)	570	470	395	498	495
Sulfate(SO_4)	210	140	155	235	245
Alkalinity ($CaCO_3$)	163	230	170	210	230
Nitrate (N)	0.84	--	--	.7	--
Silica(SiO_2)	13	13.1	16.0	10.	15.6
Fluoride (F)	1.4	1.4	1.06	1.3	1.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 363
Location: Canadian River near Canadian, Texas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	3/29/60	4/6/60	5/24/60	6/29/60	7/25/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	5:15 pm	5:00 pm	4:30 pm	2:50 pm	5:45 pm
Temperature of stream: °F	70	--	--	82	93
Discharge (cfs)	60	2.4	11.	320	450
Spec. cond. micromhos @ 25° C (field)	2,600	750	--	3,100	2,300
Spec. cond. micromhos @ 25° C (lab.)	2,840	840	660	3,000	2,200
pH	7.4	7.9	7.6	7.9	7.9
Turbidity, Jackson units	< 25	--	< 25	> 2,000	1,500
Dissolved solids*	1.960	510	426	1,940	1,350
Boron (B)	0.23	0.12	.10	0.4	0.23
Calcium (Ca)	124	80	69	116	88
Magnesium (Mg)	49	12	17	39	36
Total Hardness ($CaCO_3$)	510	250	360	450	370
Sodium (Na)	465	97	55	465	340
Potassium (K)	8.9	4.2	2.0	10.0	13.2
Chloride (Cl)	730	90	50	670	470
Sulfate(SO_4)	245	26	4	295	212
Alkalinity ($CaCO_3$)	180	200	290	228	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	15.2	30.4	24	15.1	13.6
Fluoride (F)	0.4	1.27	1.4	1.0	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 363
Location: Canadian River near Canadian, Texas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	8/18/60	9/20/60	10/19/60	11/15/60	12/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	6:30 am	7:30 am	8:30 pm	11:05 am	12:00 N
Temperature of stream: °F	66	67	50	54	37
Discharge (cfs)	9,520	223	13,100	79	--
Spec. cond. micromhos @ 25° C (field)	550	1,900	1,000	2,450	2,400
Spec. cond. micromhos @ 25° C (lab.)	830	1,900	1,235	2,700	2,313
pH	8.0	8.1	7.5	7.9	7.4
Turbidity, Jackson units	> 5,000	2,500	> 5,000	650	--
Dissolved solids*	580	1,230	710	1,525	1,356
Boron (B)	0.6	0.24	0.15	0.18	.20
Calcium (Ca)	80	92	75	108	104
Magnesium (Mg)	21	32	27	36	39
Total Hardness ($CaCO_3$)	290	360	300	420	420
Sodium (Na)	110	285	138	355	290
Potassium (K)	3.9	6.0	5.5	8.3	6.8
Chloride (Cl)	125	410	200	580	440
Sulfate(SO_4)	85	[illegible]50	95	225	265
Alkalinity ($CaCO_3$)	240	128	224	216	216
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	11.2	12.8	12.0	13.2	12.3
Fluoride (F)	0.7	0.6	0.8	1.0	1.15

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 363
Location: Canadian River near Canadian, Texas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	1/11/61	1/25/61	2/15/61	3/15/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	11:10 am	9:20 am	10:35 am	11:30 am	4:05 pm
Temperature of stream: °F	35	32	43	55	62
Discharge (cfs)	--	--	--	--	--
Spec. cond. micromhos @ 25° C (field)	--	2,250	2,250	2,200	--
Spec. cond. micromhos @ 25° C (lab.)	2,360	3,290	2,280	2,250	2,450
pH	8.1	7.6	7.55	7.45	8.3
Turbidity, Jackson units	--	--	500	900	--
Dissolved solids*	1,460	1,990	1,398	1,368	1,490
Boron (B)	.93	.235	.24	.20	.36
Calcium (Ca)	107	156	100	104	110
Magnesium (Mg)	46	53	41	46	48
Total Hardness ($CaCO_3$)	455	610	420	450	470
Sodium (Na)	347	405	250	275	355
Potassium (K)	--	7.5	8.8	6.8	--
Chloride (Cl)	488	680	460	395	520
Sulfate(SO_4)	277	450	62	325	262
Alkalinity ($CaCO_3$)	220	244	212	212	230
Nitrate (N)	.5	--	--	--	.7
Silica(SiO_2)	11.	15.4	10.0	12.1	13.
Fluoride (F)	4.0	1.63	1.16	1.17	1.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 363
Location: Canadian River near Canadian, Texas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/17/61	5/15/61			
Laboratory:	RATSEC	RATSEC			
Time of collection:	--	2:30 pm			
Temperature of stream: °F	78	73			
Discharge (cfs)	--	--			
Spec. cond. micromhos @ 25° C (field)	2,730	800			
Spec. cond. micromhos @ 25° C (lab.)	2,780	800			
pH	--	7.45			
Turbidity, Jackson units	108	< 25			
Dissolved solids*	1,712	455			
Boron (B)	1.3	.10			
Calcium (Ca)	128	72			
Magnesium (Mg)	49	17			
Total Hardness ($CaCO_3$)	520	252			
Sodium (Na)	350	70			
Potassium (K)	7.8	2.8			
Chloride (Cl)	550	76			
Sulfate(SO_4)	388	18			
Alkalinity ($CaCO_3$)	224	248			
Nitrate (N)	--	--			
Silica(SiO_2)	13.2	21.0			
Fluoride (F)	.81	1.12			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 362
Location: Canadian River near Amarillo, Texas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	11/3/59	12/29/59	1/27/60	2/16/60	2/24/60
Laboratory:	USGS	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	5:45 pm	--	4:15 pm	4:45 pm	9:15 am
Temperature of stream: °F	56	--	43	51	32
Discharge (cfs)	15	117	180	149	20
Spec. cond. micromhos @ 25° C (field)	--	--	1,800	--	3,600
Spec. cond. micromhos @ 25° C (lab.)	2,100	1,700	1,600	2,020	3,000
pH	7.4	7.6	7.7	8.1	7.8
Turbidity, Jackson units	--	800	1,000	--	< 25
Dissolved solids*	1,350	1,070	1,070	1,250	2,050
Boron (B)	0.60	0.35	0.27	0.25	0.56
Calcium (Ca)	96	92	116	96	150
Magnesium (Mg)	58	27	7	34	68
Total Hardness ($CaCO_3$)	480	340	310	380	650
Sodium (Na)	288	100	200	(Na+K) 300	490
Potassium (K)	--	5.5	5.2	--	6.2
Chloride (Cl)	330	255	200	330	495
Sulfate(SO_4)	319	200	350	317	500
Alkalinity ($CaCO_3$)	258	250	190	225	320
Nitrate (N)	12.4	--	--	2.5	--
Silica(SiO_2)	47	14.0	13.3	12.0	30.4
Fluoride (F)	2.8	0.8	0.60	1.0	1.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 362
Location: Canadian River near Amarillo, Texas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	3/29/60	4/5/60	5/24/60	6/30/60	7/26/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:00 am	9:15 am	1:20 pm	8:50 am	6:30 am
Temperature of stream: °F	54	--	--	68	76
Discharge (cfs)	73	18	11	200	207
Spec. cond. micromhos @ 25° C (field)	1,850	1,100	--	1,050	1,875
Spec. cond. micromhos @ 25° C (lab.)	1,950	1,360	1,200	1,140	1,700
pH	7.4	7.6	7.6	8.0	7.8
Turbidity, Jackson units	245	--	--	> 2,000	650
Dissolved solids*	1,360	773	718	770	1,120
Boron (B)	0.17	0.10	0.19	0.4	0.23
Calcium (Ca)	108	80	60	68	84
Magnesium (Mg)	36	29	36	17	34
Total Hardness ($CaCO_3$)	420	320	300	240	350
Sodium (Na)	310	138	97	165	275
Potassium (K)	6.7	14.9	7.6	6.5	7.5
Chloride (Cl)	335	120	80	140	298
Sulfate(SO_4)	250	130	50	150	255
Alkalinity ($CaCO_3$)	240	220	250	240	--
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	5.0	39.6	32.0	16.5	13.6
Fluoride (F)	0.4	2.40	--	0.6	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 362
Location: Canadian River near Amarillo, Texas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	8/18/60	9/20/60	10/19/60	11/15/60	12/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:10 am	5:45 pm	1:00 pm	2:10 pm	4:30 pm
Temperature of stream: °F	67	72	51	52	36
Discharge (cfs)	356	112	3,710	54	137
Spec. cond. micromhos @ 25° C (field)	1,200	1,950	550	2,500	2,100
Spec. cond. micromhos @ 25° C (lab.)	1,210	1,850	725	2,450	2,127
pH	8.0	7.9	7.7	7.8	7.5
Turbidity, Jackson units	> 5,000	> 5,000	> 5,000	300	--
Dissolved solids*	850	1,235	440	1,520	1,305
Boron (B)	0.26	0.32	0.20	0.30	0.24
Calcium (Ca)	60	92	54	104	100
Magnesium (Mg)	39	36	12	44	36
Total Hardness ($CaCO_3$)	310	380	184	440	400
Sodium (Na)	190	365	82	360	323
Potassium (K)	5.2	5.5	3.8	7.5	5.5
Chloride (Cl)	185	345	50	440	290
Sulfate(SO_4)	220	330	75	325	337
Alkalinity ($CaCO_3$)	220	184	228	220	224
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.8	13.2	11.4	17.2	11.9
Fluoride (F)	0.7	0.4	0.7	1.0	0.87

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 362
Location: Canadian River near Amarillo, Texas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	1/10/61	1/24/61	2/14/61	3/15/61	4/3/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:20 pm	2:45 pm	5:35 am	8:40 am	4:15 pm
Temperature of stream: °F	41	32	53	46	81
Discharge (cfs)	94	49	--	1,520	--
Spec. cond. micromhos @ 25° C (field)	--	2,400	2,200	1,600	1,720
Spec. cond. micromhos @ 25° C (lab.)	2,220	2,350	2,300	--	1,730
pH	7.6	7.4	7.5	7.5	--
Turbidity, Jackson units	--	--	200	460	550
Dissolved solids*	1,420	1,543	1,439	999	1,063
Boron (B)	1.0	0.235	0.29	0.165	0.32
Calcium (Ca)	101	116	112	96	84
Magnesium (Mg)	45	44	34	39	39
Total Hardness ($CaCO_3$)	435	470	420	400	370
Sodium (Na)	329	303	260	195	210
Potassium (K)	--	6.5	8.2	5.5	5.8
Chloride (Cl)	368	420	360	205	235
Sulfate(SO_4)	376	375	50	318	350
Alkalinity ($CaCO_3$)	231	232	212	180	200
Nitrate (N)	1.6	--	--	--	--
Silica(SiO_2)	14.0	15.8	9.2	10.3	11.9
Fluoride (F)	1.1	1.20	1.05	0.92	1.38

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 361
Location: Canadian River at Logan, New Mexico
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	11/4/59	12/29/59	1/27/60	2/17/60	2/24/60
Laboratory:	USGS	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	11:00 am	--	11:10 am	10:15 am	1:00 pm
Temperature of stream: °F	50	--	42	--	32
Discharge (cfs)	29	35	34	12	10
Spec. cond. micromhos @ 25° C (field)	--	--	1,900	--	5,000
Spec. cond. micromhos @ 25° C (lab.)	1,620	2,300	2,500	3,270	4,000
pH	8.2	7.6	8.2	8.2	8.4
Turbidity, Jackson units	--	500	600	--	< 25
Dissolved solids*	1,020	1,700	1,620	2,170	2,900
Boron (B)	0.38	0.45	0.40	0.38	0.30
Calcium (Ca)	48	102	92	115	125
Magnesium (Mg)	35	50	56	57	73
Total Hardness ($CaCO_3$)	265	460	560	520	600
Sodium (Na)	264	410	425	(Na+K) 578	785
Potassium (K)	--	5.5	5.2	--	7.3
Chloride (Cl)	160	360	300	545	750
Sulfate(SO_4)	373	550	620	670	950
Alkalinity ($CaCO_3$)	220	280	270	307	320
Nitrate (N)	0.75	--	--	0.3	--
Silica(SiO_2)	5.5	13.0	14.8	6.5	7.2
Fluoride (F)	0.9	0.9	0.66	1.0	1.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 361
Location: Canadian River at Logan, New Mexico
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	3/29/60	4/5/60	5/24/60	6/30/60	7/26/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:00 pm	5:20 pm	10:15 am	12:05 pm	9:15 am
Temperature of stream: °F	66	77	--	82	76
Discharge (cfs)	10	3	1	21	138
Spec. cond. micromhos @ 25° C (field)	3,000	4,000	--	850	950
Spec. cond. micromhos @ 25° C (lab.)	3,400	4,700	5,700	1,750	810
pH	7.9	7.5	7.8	7.8	7.7
Turbidity, Jackson units	< 25	--	< 25	200	> 5,000
Dissolved solids*	2,420	3,275	3,560	1,120	590
Boron (B)	0.37	0.40	0.13	0.2	0.20
Calcium (Ca)	128	184	136	68	58
Magnesium (Mg)	68	44	87	17	16
Total Hardness ($CaCO_3$)	600	640	700	240	210
Sodium (Na)	660	9.5	1,000	285	125
Potassium (K)	7.5	9.0	10.0	4.7	4.3
Chloride (Cl)	750	950	1,250	300	80
Sulfate(SO_4)	600	925	825	240	158
Alkalinity ($CaCO_3$)	300	300	180	204	188
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	3.8	4.4	8.0	11.4	13.2
Fluoride (F)	0.9	0.84	1.0	0.9	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 361
Location: Canadian River at Logan, New Mexico
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	8/18/60	9/20/60	10/19/60	11/16/60	12/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:20 am	2:55 pm	4:15 pm	8:15 am	2:10 pm
Temperature of stream: °F	66	74	50	36	35
Discharge (cfs)	37	30	912	22	115
Spec. cond. micromhos @ 25° C (field)	2,200	2,100	530	3,000	1,400
Spec. cond. micromhos @ 25° C (lab.)	2,000	1,900	740	2,900	1,338
pH	8.0	7.9	7.4	7.8	7.4
Turbidity, Jackson units	200	280	5,000	< 25	--
Dissolved solids*	1,300	1,290	450	1,875	888
Boron (B)	0.30	0.30	0.17	0.36	0.21
Calcium (Ca)	84	80	62	92	80
Magnesium (Mg)	34	34	15	58	34
Total Hardness ($CaCO_3$)	350	340	220	470	340
Sodium (Na)	345	275	69	470	163
Potassium (K)	6.2	2.5	4.4	5.8	4.5
Chloride (Cl)	380	330	32	430	115
Sulfate(SO_4)	350	400	113	688	375
Alkalinity ($CaCO_3$)	216	200	232	116	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.8	8.8	11.4	6.2	8.0
Fluoride (F)	0.8	0.5	0.6	0.8	0.60

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 361
Location: Canadian River at Logan, New Mexico
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	1/10/61	1/24/61	2/14/61	3/14/61	4/4/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:30 am	12:00 N	3:40 pm	4:45 pm	--
Temperature of stream: °F	32	32	50	64	61
Discharge (cfs)	53	53	138	135	--
Spec. cond. micromhos @ 25° C (field)	--	1,600	1,340	1,125	1,800
Spec. cond. micromhos @ 25° C (lab.)	1,690	1,600	1,320	1,160	1,680
pH	7.9	7.4	7.6	7.5	8.0
Turbidity, Jackson units	--	--	178	240	> 25
Dissolved solids*	1,120	1,052	892	728	1,139
Boron (B)	0.71	0.19	0.15	0.12	0.31
Calcium (Ca)	88	88	80	80	96
Magnesium (Mg)	51	39	36	32	41
Total Hardness ($CaCO_3$)	430	380	350	330	410
Sodium (Na)	227	205	170	115	185
Potassium (K)	--	5.0	5.3	4.9	6.0
Chloride (Cl)	188	185	120	64	188
Sulfate(SO_4)	418	425	356	325	413
Alkalinity ($CaCO_3$)	220	208	184	164	200
Nitrate (N)	0.3	--	--	--	--
Silica(SiO_2)	8.4	6.2	4.8	4.7	6.6
Fluoride (F)	8.0	0.76	0.70	0.60	0.44

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 283
Location: Verdigris River near Inola, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/27/59	12/8/59	12/22/59	1/27/60	2/15/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	10:00 am	2:15 pm	12:10 pm	12:10 pm
Temperature of stream: °F	--	--	45	37	37
Discharge (cfs)	8,880	630	3,400	1,920	2,910
Spec. cond. micromhos @ 25° C (field)	--	1,050	490	750	--
Spec. cond. micromhos @ 25° C (lab.)	375	1,020	540	820	657
pH	7.6	7.5	7.4	7.8	7.9
Turbidity, Jackson units	--	< 25	75	50	--
Dissolved solids*	207	715	435	545	397
Boron (B)	0.11	0.12	0.60	0.06	.16
Calcium (Ca)	51	135	60	94	74
Magnesium (Mg)	7.5	6.	12	24	11
Total Hardness ($CaCO_3$)	158	360	200	310	230
Sodium (Na)	15	100	450	66	(Na+K) 50
Potassium (K)	--	4.0	4.9	3.1	--
Chloride (Cl)	29	180	95	100	92
Sulfate(SO_4)	16	60	15	48	49
Alkalinity ($CaCO_3$)	131	250	110	180	154
Nitrate (N)	0.29	--	--	--	0.7
Silica(SiO_2)	8.0	10.4	10.2	10.4	8.0
Fluoride (F)	0.1	0.2	0.2	0.20	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 283
Location: Verdigris River near Inola, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/23/60	3/28/60	4/4/60	5/24/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	4:35 pm	4:45 pm	3:30 pm	8:55 am	6:30 am
Temperature of stream: °F	38	52	70	73	81
Discharge (cfs)	2,500	6,400	6,400	3,120	574
Spec. cond. micromhos @ 25° C (field)	875	475	560	455	705
Spec. cond. micromhos @ 25° C (lab.)	760	520	600	460	750
pH	8.1	7.7	7.7	7.5	7.4
Turbidity, Jackson units	45	250	--	125	< 25
Dissolved solids*	530	320	355	316	410
Boron (B)	.06	0.06	0.05	.03	0.9
Calcium (Ca)	84	72	48	50	92
Magnesium (Mg)	32	5	22	14	7
Total Hardness ($CaCO_3$)	340	200	210	180	250
Sodium (Na)	60	36	37	39	57
Potassium (K)	2.4	3.1	5.9	3.0	2.5
Chloride (Cl)	115	50	55	50	100
Sulfate(SO_4)	65	30	40	35	33
Alkalinity ($CaCO_3$)	180	130	150	120	176
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	7.2	10.6	8.8	9.2	7.5
Fluoride (F)	0.4	0.9	0.16	0.12	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 283
Location: Verdigris River near Inola, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/25/60	8/16/60	9/20/60	10/18/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:00 pm	7:30 am	8:10 am	7:45 am	5:15 pm
Temperature of stream: °F	78	81	78	67	58
Discharge (cfs)	3,250	389	98	1,140	327
Spec. cond. micromhos @ 25° C (field)	520	800	830	700	620
Spec. cond. micromhos @ 25° C (lab.)	450	740	775	700	650
pH	7.5	7.9	7.9	7.1	7.7
Turbidity, Jackson units	300	< 25	< 25	48	90
Dissolved solids*	300	420	455	365	345
Boron (B)	0.15	0.11	0.18	0.10	0.19
Calcium (Ca)	37	64	64	59	60
Magnesium (Mg)	26	19	17	24	10
Total Hardness ($CaCO_3$)	200	240	230	270	190
Sodium (Na)	50	93	78	390	50
Potassium (K)	6.0	3.4	1.9	6.5	4.5
Chloride (Cl)	86	160	165	670	108
Sulfate(SO_4)	26	31	29	200	29
Alkalinity ($CaCO_3$)	74	124	88	96	120
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	7.0	5.8	7.4	9.7	7.6
Fluoride (F)	0.1	0.3	0.4	0.4	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 283
Location: Verdigris River near Inola, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/27/60	1/9/61	1/24/61	2/13/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	2:40 pm	3:15 pm	4:15 pm	5:00 pm	4:45 pm
Temperature of stream: °F	37	38	32	47	55
Discharge (cfs)	--	519	485	502	1,210
Spec. cond. micromhos @ 25° C (field)	675	--	970	1,040	460
Spec. cond. micromhos @ 25° C (lab.)	858	813	910	1,080	520
pH	7.35	7.7	7.6	7.45	7.6
Turbidity, Jackson units	--	--	--	< 25	450
Dissolved solids*	395	498	540	604	294
Boron (B)	0.10	0.60	0.065	0.07	0.04
Calcium (Ca)	65	77	96	92	48
Magnesium (Mg)	13	19	7	15	12
Total Hardness ($CaCO_3$)	216	270	270	290	170
Sodium (Na)	55	56	71	100	25
Potassium (K)	3.5	--	3.1	3.8	3.4
Chloride (Cl)	108	125	160	194	66
Sulfate(SO_4)	44	46	52	67	31
Alkalinity ($CaCO_3$)	140	164	160	168	108
Nitrate (N)	--	0.9	--	--	--
Silica(SiO_2)	8.2	5.7	5.8	2.0	6.2
Fluoride (F)	0.37	0.4	0.04	0.29	0.40

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 283
Location: Verdigris River near Inola, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/11/61	4/18/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	4:05 pm	3:00 pm	6:30 pm		
Temperature of stream: °F	51	54	67		
Discharge (cfs)	--	7,124	45,000		
Spec. cond. micromhos @ 25° C (field)	--	560	315		
Spec. cond. micromhos @ 25° C (lab.)	658	629	410		
pH	8.0	7.9	7.6		
Turbidity, Jackson units	--	86	152		
Dissolved solids*	393	570	205		
Boron (B)	0.28	0.18	0.03		
Calcium (Ca)	69	168	40		
Magnesium (Mg)	12	15	6		
Total Hardness ($CaCO_3$)	220	363	124		
Sodium (Na)	50	35	16		
Potassium (K)	--	2.1	3.2		
Chloride (Cl)	90	76	40		
Sulfate(SO_4)	44	39	37		
Alkalinity ($CaCO_3$)	154	144	88		
Nitrate (N)	0.3	--	--		
Silica(SiO_2)	6.2	--	7.5		
Fluoride (F)	0.3	--	0.18		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 259
Location: Arkansas River at Tulsa, Oklahoma
Basin: Arkansas River
Tributary to: --

Date collected:	10/27/59	12/8/59	12/22/59	1/27/60	2/15/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	11:00 am	3:00 pm	11:20 am	11:25 am
Temperature of stream: °F	--	--	45	40	35
Discharge (cfs)	8,070	3,710	8,520	4,630	11,100
Spec. cond. micromhos @ 25° C (field)	--	3,000	1,000	3,000	--
Spec. cond. micromhos @ 25° C (lab.)	2,200	3,100	1,140	2,900	1,530
pH	7.6	7.8	7.5	7.6	8.0
Turbidity, Jackson units	--	< 25	700	190	--
Dissolved solids*	1,250	2,040	800	1,700	910
Boron (B)	0.10	0.08	0.22	0.15	0.06
Calcium (Ca)	136	175	156	116	85
Magnesium (Mg)	20	24	51	32	19
Total Hardness ($CaCO_3$)	420	535	600	420	290
Sodium (Na)	298	490	160	450	(Na+K) 211
Potassium (K)	--	6	4.6	5.4	--
Chloride (Cl)	482	700	245	670	308
Sulfate(SO_4)	162	230	125	200	170
Alkalinity ($CaCO_3$)	217	260	140	210	133
Nitrate (N)	0.68	--	--	--	1.0
Silica(SiO_2)	16	12.8	14.8	12.6	10.
Fluoride (F)	0.1	0.3	0.8	0.38	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 259
Location: Arkansas River at Tulsa, Oklahoma
Basin: Arkansas River
Tributary to: --

Date collected:	2/23/60	3/28/60	4/4/60	5/24/60	6/27/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:45 pm	3:45 pm	2:30 pm	10:10 am	4:40 pm
Temperature of stream: °F	37	59	70	75	87
Discharge (cfs)	7,620	23,100	15,600	6,980	6,540
Spec. cond. micromhos @ 25° C (field)	2,800	660	1,150	1,700	1,380
Spec. cond. micromhos @ 25° C (lab.)	2,300	700	1,160	1,600	1,400
pH	8.1	7.7	8.0	7.9	7.4
Turbidity, Jackson units	190	700	--	189	800
Dissolved solids*	1,513	490	721	1,084	862
Boron (B)	0.12	0.05	0.09	0.045	0.2
Calcium (Ca)	124	68	88	96	88
Magnesium (Mg)	38	17	17	29	24
Total Hardness (CaCO$_3$)	470	240	290	360	320
Sodium (Na)	320	86	115	262	165
Potassium (K)	5.4	5.2	5.9	6.3	6.5
Chloride (Cl)	490	100	160	340	290
Sulfate(SO$_4$	260	45	150	170	100
Alkalinity (CaCO$_3$)	220	150	160	210	152
Nitrate (N)	--	--	--	--	--
Silica(SiO$_2$)	12.1	14.0	12.3	10.4	11.9
Fluoride (F)	0.8	0.8	0.26	0.58	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 259
Location: Arkansas River at Tulsa, Oklahoma
Basin: Arkansas River
Tributary to: -

Date collected:	7/25/60	8/15/60	9/20/60	10/17/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	1:50 pm	6:25 pm	6:45 am	4:30 pm	3:50 pm
Temperature of stream: °F	85	84	75	69	66
Discharge (cfs)	9,130	8,070	3,410	2,510	3,670
Spec. cond. micromhos @ 25° C (field)	1,700	1,500	1,850	3,200	2,380
Spec. cond. micromhos @ 25° C (lab.)	1,520	--	1,900	3,200	2,235
pH	7.6	--	8.2	7.4	7.4
Turbidity, Jackson units	280	430	450	< 25	110
Dissolved solids*	1,027	--	1,110	1,760	1,265
Boron (B)	0.16	0.11	0.13	0.10	0.13
Calcium (Ca)	76	--	104	104	100
Magnesium (Mg)	27	--	46	39	24
Total Hardness ($CaCO_3$)	300	--	450	420	350
Sodium (Na)	270	--	250	494	295
Potassium (K)	5.7	--	6.2	6.8	6.5
Chloride (Cl)	405	370	385	810	515
Sulfate(SO_4	130	115	170	192	188
Alkalinity ($CaCO_3$)	156	--	160	156	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	8.8	8.8	11.1	8.0	10.0
Fluoride (F)	0.2	--	0.5	0.7	0.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 259
Location: Arkansas River at Tulsa, Oklahoma
Basin: Arkansas River
Tributary to: --

Date collected:	12/29/60	1/9/61	1/24/61	2/13/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	8:15 am	2:25 pm	3:15 pm	4:05 pm	3:10 pm
Temperature of stream: °F	37	39	32	55	60
Discharge (cfs)	2,940	2,610	1,860	2,300	2,330
Spec. cond. micromhos @ 25° C (field)	3,500	--	3,600	3,700	3,050
Spec. cond. micromhos @ 25° C (lab.)	3,550	3,220	3,400	3,500	3,220
pH	7.5	8.2	7.4	7.4	7.8
Turbidity, Jackson units	--	--	--	> 25	< 25
Dissolved solids*	2,016	1,910	2,041	2,066	1,767
Boron (B)	0.14	0.37	0.155	0.19	0.12
Calcium (Ca)	124	131	132	128	100
Magnesium (Mg)	32	35	44	41	3.9
Total Hardness ($CaCO_3$)	440	470	510	490	410
Sodium (Na)	550	518	506	475	410
Potassium (K)	5.5	--	5.5	6.2	4.9
Chloride (Cl)	840	800	880	900	750
Sulfate(SO_4	208	223	265	248	232
Alkalinity ($CaCO_3$)	208	233	168	208	156
Nitrate (N)	--	1.0	--	--	--
Silica(SiO_2)	10.6	12	7.3	4.6	6.9
Fluoride (F)	0.60	0.3	0.10	0.39	0.66

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 259
Location: Arkansas River at Tulsa, Oklahoma
Basin: Arkansas River
Tributary to: --

Date collected:	4/12/61	4/18/61	5/17/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	9:05 am	4:00 pm	7:40 pm		
Temperature of stream: °F	46	52	68		
Discharge (cfs)	9,210	7,630	11,800		
Spec. cond. micromhos @ 25° C (field)	--	1,410	1,500		
Spec. cond. micromhos @ 25° C (lab.)	1,890	1,335	1,450		
pH	7.8	7.5	7.9		
Turbidity, Jackson units	--	330	350		
Dissolved solids*	1,140	793	898		
Boron (B)	.52	.085	.11		
Calcium (Ca)	101	80	96		
Magnesium (Mg)	31	19	22		
Total Hardness ($CaCO_3$)	380	280	330		
Sodium (Na)	254	180	185		
Potassium (K)	--	4.1	5.3		
Chloride (Cl)	405	270	310		
Sulfate(SO_4	168	106	120		
Alkalinity ($CaCO_3$)	184	148	168		
Nitrate (N)	0.6	--	--		
Silica(SiO_2)	9.0	10.4	9.2		
Fluoride (F)	0.3	0.44	0.50		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 258
Location: Cimarron River near Mannford, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	** 10/27/59	12/8/59	12/22/59	1/28/60	2/17/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	3:40 pm	9:55 am	10:20 am	10:20 am
Temperature of stream: °F	--	45	43	42	39
Discharge (cfs)	1,060	605	1,860	665	1,810
Spec. cond. micromhos @ 25° C (field)	--	8,500	1,300	7,000	--
Spec. cond. micromhos @ 25° C (lab.)	6,250	7,650	1,550	7,000	6,260
pH	7.5	7.5	7.4	7.7	7.7
Turbidity, Jackson units	--	< 25	1,000	300	--
Dissolved solids*	3,670	4,930	980	4,330	3,820
Boron (B)	0.40	0.20	0.30	0.67	.20
Calcium (Ca)	232	200	70	176	212
Magnesium (Mg)	29	66	14	57	71
Total Hardness ($CaCO_3$)	700	770	230	680	820
Sodium (Na)	1,120	1,500	270	1,380	(Na+K) 1,080
Potassium (K)	--	8	4.0	6.3	--
Chloride (Cl)	1,800	2,300	400	2,000	1,700
Sulfate(SO_4)	313	340	80	375	527
Alkalinity ($CaCO_3$)	266	270	130	270	223
Nitrate (N)	0.81	--	--	--	.3
Silica(SiO_2)	8.0	16.4	11.2	14.0	12.
Fluoride (F)	--	0.3	0.5	0.46	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

** Analytical results expressed as parts per million except as noted (column one only). Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 258
Location: Cimarron River near Mannford, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/23/60	3/28/60	4/5/60	5/24/60	6/22/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	2:00 pm	1:35 pm	11:50 am	11:35 am	3:20 pm
Temperature of stream: °F	40	64	57	--	89
Discharge (cfs)	154	1,500	1,620	2,420	1,570
Spec. cond. micromhos @ 25° C (field)	6,400	6,600	4,600	--	5,400
Spec. cond. micromhos @ 25° C (lab.)	6,000	6,600	4,900	3,500	5,100
pH	8.0	7.7	7.8	7.7	7.9
Turbidity, Jackson units	350	210	--	360	120
Dissolved solids*	4,100	4,150	3,154	2,260	3,120
Boron (B)	0.30	0.32	0.26	.08	0.3
Calcium (Ca)	224	224	188	124	156
Magnesium (Mg)	73	71	56	41	63
Total Hardness ($CaCO_3$)	860	850	700	480	650
Sodium (Na)	1,100	1,200	800	700	875
Potassium (K)	6.5	7.5	8.7	6.5	8.4
Chloride (Cl)	1,700	1,910	1,150	950	1,475
Sulfate(SO_4)	600	450	625	325	250
Alkalinity ($CaCO_3$)	260	250	230	190	172
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	11.7	14.0	11.8	10.4	12.3
Fluoride (F)	0.7	0.8	0.45	.3	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 258
Location: Cimarron River near Mannford, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	6/27/60	7/25/60	8/15/60	9/19/60	10/17/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:20 pm	6:15 pm	5:15 pm	3:20 pm	3:20 pm
Temperature of stream: °F	89	84	86	83	68
Discharge (cfs)	1,110	14,400	1,350	525	1,050
Spec. cond. micromhos @ 25° C (field)	5,400	1,700	5,500	5,500	7,200
Spec. cond. micromhos @ 25° C (lab.)	5,200	1,550	5,000	5,000	7,000
pH	7.6	7.7	7.9	8.1	7.5
Turbidity, Jackson units	85	> 5,000	> 5,000	175	> 5,000
Dissolved solids*	3,290	990	3,450	2,960	4,110
Boron (B)	0.14	0.11	0.23	0.21	0.29
Calcium (Ca)	160	76	240	204	156
Magnesium (Mg)	56	27	46	41	53
Total Hardness ($CaCO_3$)	630	300	790	680	610
Sodium (Na)	1,000	250	940	690	1,165
Potassium (K)	8.6	6.0	6.9	13.1	7.5
Chloride (Cl)	1,470	400	1,475	1,325	1,750
Sulfate(SO_4)	250	105	615	525	175
Alkalinity ($CaCO_3$)	172	164	164	164	184
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.3	12.0	12.6	10.6	10.6
Fluoride (F)	0.10	0.3	0.3	1.0	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 258
Location: Cimarron River near Mannford, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	11/15/60	12/29/60	1/9/61	1/24/61	2/13/61
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	3:00 pm	9:20 am	1:10 pm	2:00 pm	3:15 pm
Temperature of stream: °F	67	37	38	32	55
Discharge (cfs)	380	625	531	429	485
Spec. cond. micromhos @ 25° C (field)	6,700	10,200	--	9,000	9,000
Spec. cond. micromhos @ 25° C (lab.)	6,900	9,700	8,200	8,600	8,300
pH	7.6	7.4	8.2	7.6	7.55
Turbidity, Jackson units	135	--	--	--	> 25
Dissolved solids*	3,850	6,022	4,970	5,332	5,342
Boron (B)	0.24	.33	1.3	.39	.21
Calcium (Ca)	180	200	198	188	172
Magnesium (Mg)	39	66	71	73	68
Total Hardness ($CaCO_3$)	610	770	785	770	710
Sodium (Na)	1,225	2,038	1,540	1,313	1,450
Potassium (K)	8.1	6.9	--	6.2	7.9
Chloride (Cl)	1,900	3,050	2,400	2,700	2,600
Sulfate(SO_4)	350	550	468	600	66
Alkalinity ($CaCO_3$)	228	272	262	232	188
Nitrate (N)	--	--	.3	--	--
Silica(SiO_2)	11.9	11.4	10.	6.2	2.0
Fluoride (F)	0.3	.54	.3	.54	.44

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 258
Location: Cimarron River near Mannford, Oklahoma
Basin: Arkansas River
Tributary to:

Date collected:	3/14/61	4/19/61	5/17/61		
Laboratory:	RATSEC	RATSEC	RATSEC		
Time of collection:	1:50 pm	9:25 am	9:00 am		
Temperature of stream: °F	60	62	68.5		
Discharge (cfs)	349	940	842		
Spec. cond. micromhos @ 25° C (field)	9,000	11,200	3,750		
Spec. cond. micromhos @ 25° C (lab.)	8,800	9,984	3,800		
pH	7.6	7.6	7.75		
Turbidity, Jackson units	--	153	420		
Dissolved solids*	5,294	6,611	2,175		
Boron (B)	.235	.22	.17		
Calcium (Ca)	172	216	136		
Magnesium (Mg)	80	70	44		
Total Hardness ($CaCO_3$)	760	830	520		
Sodium (Na)	1,588	1,900	670		
Potassium (K)	6.2	7.1	7.9		
Chloride (Cl)	2,650	3,350	900		
Sulfate(SO_4)	462	588	300		
Alkalinity ($CaCO_3$)	188	196	144		
Nitrate (N)	--	--	--		
Silica(SiO_2)	4.8	9.9	8.4		
Fluoride (F)	.71	.71	.55		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	253
Location:	Cimarron River near Perkins, Oklahoma
Basin:	Arkansas River
Tributary to:	Arkansas River

Date collected:	10/28/59	12/9/59	12/22/59	1/28/60	2/17/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	1:10 pm	9:10 am	11:35 am	11:30 am	11:45 am
Temperature of stream: °F	55	41	44	41	41
Discharge (cfs)	732	450	1,500	896	1,650
Spec. cond. micromhos @ 25° C (field)	--	10,000	4,000	9,000	--
Spec. cond. micromhos @ 25° C (lab.)	8,350	8,500	4,800	9,400	7,660
pH	7.6	7.7	7.2	8.1	8.2
Turbidity, Jackson units	--	< 25	250	190	--
Dissolved solids*	4,850	5,850	3,030	6,080	4,790
Boron (B)	0.44	0.26	0.04	0.73	0.30
Calcium (Ca)	208	230	134	212	248
Magnesium (Mg)	78	55	40	68	73
Total Hardness ($CaCO_3$)	840	800	500	800	920
Sodium (Na)	(Na+K) 1,520	1,800	870	2,000	(Na+K) 1,420
Potassium (K)	--	8	6.1	7.3	--
Chloride (Cl)	2,400	2,750	1,450	2,500	2,200
Sulfate(SO_4)	460	480	300	525	617
Alkalinity ($CaCO_3$)	282	270	170	270	249
Nitrate (N)	0.72	--	--	--	1.0
Silica(SiO_2)	14	15.2	10.0	15.2	5.5
Fluoride (F)	0.3	0.4	0.5	0.48	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 253
Location: Cimarron River near Perkins, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/23/60	3/28/60	4/5/60	5/24/60	6/30/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:30 am	12:10 pm	2:00 pm	11:50 am	10:20 am
Temperature of stream: °F	36	62	61	--	81
Discharge (cfs)	1,460	1,120	931	678	3,480
Spec. cond. micromhos @ 25° C (field)	8,000	6,000	6,000	--	6,500
Spec. cond. micromhos @ 25° C (lab.)	7,500	6,500	6,600	5,600	6,500
pH	8.2	7.5	7.9	7.7	7.9
Turbidity, Jackson units	350	220	--	281	65
Dissolved solids*	5,240	4,440	4,194	3,520	4,150
Boron (B)	0.33	0.33	0.31	0.08	0.4
Calcium (Ca)	248	224	224	168	176
Magnesium (Mg)	78	73	68	53	61
Total Hardness ($CaCO_3$)	940	860	840	640	690
Sodium (Na)	1,400	1,200	975	1,050	1,140
Potassium (K)	7.5	8.2	7.6	7.1	7.8
Chloride (Cl)	2,250	1,700	1,550	1,450	1,825
Sulfate(SO_4)	775	500	725	575	275
Alkalinity ($CaCO_3$)	250	260	200	210	172
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.6	14.0	11.8	10.6	13.0
Fluoride (F)	0.8	0.7	0.40	0.17	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 253
Location: Cimarron River near Perkins, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/25/60	8/15/60	9/19/60	10/17/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:30 pm	1:30 pm	12:10 pm	11:45 am	12:50 pm
Temperature of stream: °F	84	81	80	65	63
Discharge (cfs)	6,740	861	308	660	430
Spec. cond. micromhos @ 25° C (field)	610	10,200	8,200	3,800	6,600
Spec. cond. micromhos @ 25° C (lab.)	610	8,300	7,500	3,500	7,070
pH	7.8	7.9	8.1	7.3	7.6
Turbidity, Jackson units	1,300	1,000	141	> 5,000	110
Dissolved solids*	390	5,690	4,780	2,065	4,170
Boron (B)	0.18	0.28	0.24	0.23	0.32
Calcium (Ca)	38	272	184	108	168
Magnesium (Mg)	28	44	58	29	58
Total Hardness ($CaCO_3$)	210	860	700	390	660
Sodium (Na)	80	1,340	1,375	540	1,350
Potassium (K)	4.5	9.2	6.5	6.5	6.6
Chloride (Cl)	110	2,820	2,475	275	2,050
Sulfate(SO_4)	48	565	455	275	500
Alkalinity ($CaCO_3$)	104	148	184	156	228
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	11.0	11.4	11.4	11.4	12.8
Fluoride (F)	0.3	0.4	1.0	0.6	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 253
Location: Cimarron River near Perkins, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/27/60	1/9/61	1/23/61	2/13/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	11:15 am	12:15 pm	11:45 am	11:35 am	1:30 pm
Temperature of stream: °F	39	38	37	52	56
Discharge (cfs)	485	435	365	520	316
Spec. cond. micromhos @ 25° C (field)	11,000	--	9,700	9,100	10,200
Spec. cond. micromhos @ 25° C (lab.)	10,390	9,350	9,000	8,750	10,800
pH	7.5	8.1	7.5	7.7	7.45
Turbidity, Jackson units	--	--	--	> 25	--
Dissolved solids*	6,464	5,730	5,765	5,348	6,173
Boron (B)	0.35	1.2	0.30	0.18	0.325
Calcium (Ca)	212	208	200	164	188
Magnesium (Mg)	75	76	75	68	80
Total Hardness ($CaCO_3$)	840	830	810	690	800
Sodium (Na)	2,250	1,830	1,613	1,263	1,813
Potassium (K)	6.5	--	6.2	7.4	6.8
Chloride (Cl)	3,150	2,800	2,850	2,750	3,100
Sulfate(SO_4)	600	554	488	43	588
Alkalinity ($CaCO_3$)	268	272	240	208	200
Nitrate (N)	--	.2	--	--	--
Silica(SiO_2)	11.9	10.	6.0	3.8	7.3
Fluoride (F)	0.54	0.3	0.59	0.54	0.66

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 253
Location: Cimarron River near Perkins, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/12/61	4/19/61	5/17/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	2:05 pm	1:30 pm	1:05 pm		
Temperature of stream: °F	50	72	75		
Discharge (cfs)	1,683	720	680		
Spec. cond. micromhos @ 25° C (field)	--	8,250	5,800		
Spec. cond. micromhos @ 25° C (lab.)	5,010	7,564	6,800		
pH	7.7	7.6	7.85		
Turbidity, Jackson units	--	100	102		
Dissolved solids*	3,030	4,866	3,518		
Boron (B)	0.54	0.275	0.24		
Calcium (Ca)	144	180	176		
Magnesium (Mg)	51	66	53		
Total Hardness ($CaCO_3$)	570	720	660		
Sodium (Na)	870	1,350	1,038		
Potassium (K)	--	5.8	7.9		
Chloride (Cl)	1,300	2,300	1,600		
Sulfate(SO_4)	434	550	450		
Alkalinity ($CaCO_3$)	174	188	176		
Nitrate (N)	.5	--	--		
Silica(SiO_2)	8.8	10.8	9.1		
Fluoride (F)	0.4	0.71	0.60		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 251
Location: Cimarron River near Guthrie, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/28/59	12/9/59	12/22/59	1/28/60	2/17/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	2:00 pm	10:20 am	12:45 pm	12:15 pm	1:50 pm
Temperature of stream: °F	55	42	44	40	42
Discharge (cfs)	516	379	925	760	1,140
Spec. cond. micromhos @ 25° C (field)	10,600	13,500	7,000	12,000	--
Spec. cond. micromhos @ 25° C (lab.)	10,600	11,800	7,200	12,200	8,060
pH	7.5	7.9	7.5	7.9	8.3
Turbidity, Jackson units	--	--	100	210	--
Dissolved solids*	6,180	7,920	4,528	7,950	5,400
Boron (B)	0.46	0.42	0.32	0.30	0.24
Calcium (Ca)	223	255	176	240	272
Magnesium (Mg)	100	80	61	170	73
Total Hardness ($CaCO_3$)	967	970	690	1,300	980
Sodium (Na)	1,980	--	1,300	2,850	(Na+K) 1,640
Potassium (K)	--	8.0	6.7	8.3	--
Chloride (Cl)	3,140	3,900	2,100	4,050	2,500
Sulfate(SO_4)	573	600	425	650	734
Alkalinity ($CaCO_3$)	244	250	200	270	244
Nitrate (N)	0.81	--	--	--	0.9
Silica(SiO_2)	14.0	11.2	12.3	14.8	10.0
Fluoride (F)	0.3	0.4	0.5	0.50	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 251
Location: Cimarron River near Guthrie, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/25/60	3/28/60	4/5/60	6/22/60	6/27/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:20 am	11:30 am	4:00 pm	4:30 pm	11:15 am
Temperature of stream: °F	32	60	64	83	83
Discharge (cfs)	784	995	792	570	458
Spec. cond. micromhos @ 25° C (field)	10,000	6,900	9,100	7,100	7,100
Spec. cond. micromhos @ 25° C (lab.)	6,200	7,000	12,000	7,100	7,500
pH	8.1	7.7	7.9	7.9	8.1
Turbidity, Jackson units	1,000	250	--	95	85
Dissolved solids*	4,310	4,700	6,505	4,350	4,728
Boron (B)	0.20	0.30	0.30	0.4	0.19
Calcium (Ca)	275	252	276	200	192
Magnesium (Mg)	80	78	100	70	70
Total Hardness ($CaCO_3$)	1,020	950	1,100	790	770
Sodium (Na)	1,500	1,275	1,600	1,250	1,575
Potassium (K)	7.8	10.3	9.3	8.2	9.1
Chloride (Cl)	1,700	1,750	2,850	2,075	2,130
Sulfate(SO_4)	1,100	800	975	300	475
Alkalinity ($CaCO_3$)	150	240	220	176	128
Nitrate (N)	--	0.3	--	--	--
Silica(SiO_2)	12.2	14.4	13.2	13.0	13.6
Fluoride (F)	0.4	0.8	0.45	0.1	0.25

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 251
Location: Cimarron River near Guthrie, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/25/60	8/15/60	9/19/60	10/17/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:15 pm	11:30 am	11:15 am	9:35 am	11:20 am
Temperature of stream: °F	85	84	82	63	70
Discharge (cfs)	4,350	542	212	452	369
Spec. cond. micromhos @ 25° C (field)	1,000	9,800	8,500	5,200	9,100
Spec. cond. micromhos @ 25° C (lab.)	1,000	8,400	7,750	5,170	8,200
pH	8.0	7.8	7.9	7.4	7.6
Turbidity, Jackson units	> 5,000	> 5,000	66	> 5,000	110
Dissolved solids*	690	5,555	4,985	2,930	5,000
Boron (B)	0.13	0.23	0.29	0.26	0.35
Calcium (Ca)	46	248	196	148	196
Magnesium (Mg)	20	51	56	39	63
Total Hardness ($CaCO_3$)	200	830	720	530	750
Sodium (Na)	150	1,690	1,425	805	1,560
Potassium (K)	4.0	9.6	6.9	7.5	7.5
Chloride (Cl)	250	2,700	2,475	300	2,400
Sulfate(SO_4)	90	565	540	300	500
Alkalinity ($CaCO_3$)	92	164	160	120	256
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.7	11.4	11.5	10.0	13.2
Fluoride (F)	0.3	0.4	0.9	0.5	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 251
Location: Cimarron River near Guthrie, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/27/60	1/9/61	1/23/61	2/13/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	10:00 am	11:00 am	10:35 am	10:20 am	12:10 pm
Temperature of stream: °F	38	37	36	51	54
Discharge (cfs)	458	404	347	542	286
Spec. cond. micromhos @ 25° C (field)	12,300	--	11,200	10,500	11,900
Spec. cond. micromhos @ 25° C (lab.)	11,640	11,200	13,000	9,800	11,200
pH	7.5	8.1	7.65	7.65	7.5
Turbidity, Jackson units	--	--	--	> 25	--
Dissolved solids*	7,329	6,920	6,691	6,059	6,891
Boron (B)	0.33	1.3	0.33	0.19	0.385
Calcium (Ca)	228	232	220	188	204
Magnesium (Mg)	78	75	75	66	85
Total Hardness ($CaCO_3$)	890	888	860	740	860
Sodium (Na)	2,325	2,210	2,000	1,500	2,075
Potassium (K)	7.0	--	6.5	7.4	6.8
Chloride (Cl)	3,600	3,390	3,350	3,000	3,550
Sulfate(SO_4)	700	635	625	42	675
Alkalinity ($CaCO_3$)	256	240	228	180	192
Nitrate (N)	--	0.2	--	--	--
Silica(SiO_2)	8.6	13.0	6.9	6.0	6.2
Fluoride (F)	0.60	0.3	0.59	0.54	0.87

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 251
Location: Cimarron River near Guthrie, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/12/61	4/20/61	5/17/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	3:15 pm	--	2:20 pm		
Temperature of stream: °F	53	70	79		
Discharge (cfs)	1,580	482	416		
Spec. cond. micromhos @ 25° C (field)	--	10,000	7,100		
Spec. cond. micromhos @ 25° C (lab.)	5,930	9,600	7,200		
pH	7.8	7.5	7.75		
Turbidity, Jackson units	--	40	57		
Dissolved solids*	3,540	6,068	4,290		
Boron (B)	0.60	0.31	33.0		
Calcium (Ca)	159	216	200		
Magnesium (Mg)	57	83	58		
Total Hardness ($CaCO_3$)	630	880	740		
Sodium (Na)	1,040	1,625	1,500		
Potassium (K)	--	7.9	8.3		
Chloride (Cl)	1,580	2,900	1,850		
Sulfate(SO_4)	478	700	550		
Alkalinity ($CaCO_3$)	169	188	172		
Nitrate (N)	0.3	--	--		
Silica(SiO_2)	10.0	11.0	9.7		
Fluoride (F)	0.4	0.71	0.71		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 769
Location: Salt Fork of Cimarron River near Okeene, Oklahoma
Basin: Arkansas River
Tributary to: Cimarron River

Date collected:	9/19/62	9/26/62			
Laboratory:	--	--			
Time of collection:	--	--			
Temperature of stream: °F	--	--			
Discharge (cfs)	--	7.0			
Spec. cond. micromhos @ 25° C (field)	--	--			
Spec. cond. micromhos @ 25° C (lab.)	10,400	8,200			
pH	--	7.9			
Turbidity, Jackson units	< 25	< 25			
Dissolved solids*	7,800	5,900			
Boron (B)	0.9	0.8			
Calcium (Ca)	352	304			
Magnesium (Mg)	63	63			
Total Hardness ($CaCO_3$)	1,100	1,000			
Sodium (Na)	2,800	2,000			
Potassium (K)	20	18			
Chloride (Cl)	3,600	2,500			
Sulfate(SO_4)	1,000	950			
Alkalinity ($CaCO_3$)	164	162			
Nitrate (N)	--	--			
Silica(SiO_2)	6.8	6.0			
Fluoride (F)	2.0	2.0			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 248
Location: Cimarron River near Waynoka, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/26/59	12/7/59	12/21/59	1/27/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	10:40 am	2:30 pm	12:30 pm	11:20 am
Temperature of stream: °F	--	42	44	37	40
Discharge (cfs)	45	99	282	320	394
Spec. cond. micromhos @ 25° C (field)	--	18,000	14,000	29,000	--
Spec. cond. micromhos @ 25° C (lab.)	28,300	20,500	16,000	29,000	16,100
pH	7.5	7.8	7.0	7.7	8.1
Turbidity, Jackson units	--	85	500	250	--
Dissolved solids*	17,700	14,000	10,570	18,100	10,200
Boron (B)	0.40	0.18	0.33	0.20	.30
Calcium (Ca)	380	280	232	340	358
Magnesium (Mg)	142	92	78	240	84
Total Hardness ($CaCO_3$)	1,530	1,080	900	950	1,240
Sodium (Na)	6,230	4,500	3,500	6,500	(Na+K) 3,340
Potassium (K)	--	11.0	10.7	13.3	--
Chloride (Cl)	9,790	7,300	5,450	9,900	5,220
Sulfate(SO_4)	1,050	780	600	1,020	900
Alkalinity ($CaCO_3$)	176	200	190	170	211
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12	16.0	14.8	13.0	12.
Fluoride (F)	0.3	0	1.0	0.54	.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 248
Location: Cimarron River near Waynoka, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/25/60	3/29/60	4/4/60	5/25/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	1:10 pm	12:05 pm	12:10 pm	1:05 pm	9:40 am
Temperature of stream: °F	33	55	58	--	79
Discharge (cfs)	250	470	195	347	29
Spec. cond. micromhos @ 25° C (field)	19,500	9,500	9,100	--	23,000
Spec. cond. micromhos @ 25° C (lab.)	16,000	9,400	9,600	8,000	20,700
pH	7.9	7.6	7.9	7.7	7.9
Turbidity, Jackson units	120	500	--	800	< 25
Dissolved solids*	11,160	6,400	6,336	5,420	14,310
Boron (B)	0.39	0.36	0.30	.08	0.4
Calcium (Ca)	370	252	272	216	392
Magnesium (Mg)	107	73	78	58	124
Total Hardness ($CaCO_3$)	1,360	930	1,000	780	1,490
Sodium (Na)	3,500	2,150	1,650	1,725	4,400
Potassium (K)	11.4	10.4	9.5	9.5	12.5
Chloride (Cl)	5,050	2,400	2,900	2,450	7,550
Sulfate(SO_4)	1,150	675	1,400	675	950
Alkalinity ($CaCO_3$)	240	190	190	140	128
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	15.0	14.4	15.0	10.0	11.7
Fluoride (F)	1.0	0.7	0.66	0	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 248
Location: Cimarron River near Waynoka, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/27/60	8/16/60	9/19/60	10/17/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	7:15 am	8:00 am	12:05 pm	4:00 pm	2:00 pm
Temperature of stream: ^{o}F	75	71	84	61	64
Discharge (cfs)	39	48	55	--	--
Spec. cond. micromhos @ 25^{o} C (field)	26,000	20,500	31,000	16,000	27,000
Spec. cond. micromhos @ 25^{o} C (lab.)	24,500	19,500	30,200	17,200	24,500
pH	7.7	7.8	8.0	7.4	7.3
Turbidity, Jackson units	< 25	< 25	< 25	310	25
Dissolved solids*	18,000	13,700	21,960	10,950	16,500
Boron (B)	0.36	0.30	0.33	0.23	0.40
Calcium (Ca)	448	384	512	236	352
Magnesium (Mg)	151	92	141	73	114
Total Hardness ($CaCO_3$)	1,740	1,340	1,860	890	1,350
Sodium (Na)	5,400	4,750	6,900	2,675	6,300
Potassium (K)	5.0	12.5	5.8	11.6	12.3
Chloride (Cl)	9,700	7,350	12,050	--	9,000
Sulfate(SO_4)	1,250	1,050	1,450	388	1,080
Alkalinity ($CaCO_3$)	120	160	124	132	160
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	10.5	9.7	8.6	10.5	11.4
Fluoride (F)	0.6	0.4	0.8	0.8	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at $103^{o}C$ by SEC laboratory and at $180^{o}C$ by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 248
Location: Cimarron River near Waynoka, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/27/60	1/9/61	1/23/61	2/13/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	2:15 pm	2:10 pm	12:30 pm	2:00 pm	3:50 pm
Temperature of stream: °F	39	43	40	51	64
Discharge (cfs)	--	116	59	432	98
Spec. cond. micromhos @ 25° C (field)	17,000	--	21,000	17,750	22,000
Spec. cond. micromhos @ 25° C (lab.)	16,370	17,300	19,400	16,500	20,600
pH	7.3	7.7	7.3	7.4	7.4
Turbidity, Jackson units	--	--	--	500	--
Dissolved solids*	10,188	10,800	12,771	10,510	13,296
Boron (B)	.26	1.3	.23	.15	.23
Calcium (Ca)	200	236	292	224	264
Magnesium (Mg)	83	86	87	75	100
Total Hardness ($CaCO_3$)	840	943	1,090	870	1,070
Sodium (Na)	3,750	(Na+K) 3,720	3,925	3,075	4,250
Potassium (K)	8.3	--	10.3	10.8	10.0
Chloride (Cl)	5,400	5,760	6,950	5,600	7,200
Sulfate(SO_4)	650	676	850	59	825
Alkalinity ($CaCO_3$)	196	194	192	188	160
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.8	14.	10.6	9.4	10.1
Fluoride (F)	.76	.5	.76	.64	1.17

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 248
Location: Cimarron River near Waynoka, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/11/61	4/18/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	9:30 am	1:20 pm	8:30 am		
Temperature of stream: °F	52.5	71	58		
Discharge (cfs)	570	156	50		
Spec. cond. micromhos @ 25° C (field)	--	16,000	23,000		
Spec. cond. micromhos @ 25° C (lab.)	18,000	14,400	21,300		
pH	7.9	7.5	7.5		
Turbidity, Jackson units	--	37	< 25		
Dissolved solids*	11,200	9,795	14,331		
Boron (B)	.62	.18	.35		
Calcium (Ca)	211	256	416		
Magnesium (Mg)	80	121	129		
Total Hardness ($CaCO_3$)	854	1,140	1,570		
Sodium (Na)	3,890	3,000	5,313		
Potassium (K)	--	8.8	11.6		
Chloride (Cl)	6,010	5,050	7,200		
Sulfate(SO_4)	633	750	1,300		
Alkalinity ($CaCO_3$)	185	172	156		
Nitrate (N)	--	--	--		
Silica(SiO_2)	14.	11.4	8.6		
Fluoride (F)	.5	.89	.76		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 862
Location: Cimarron River near Buffalo, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/27/59	12/7/59	12/22/59	1/27/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	3:20 pm	9:30 am	1:30 pm	12:35 pm
Temperature of stream: °F	--	49	42	--	40
Discharge (cfs)	--	--	--	--	--
Spec. cond. micromhos @ 25° C (field)	--	6,000	5,000	10,000	--
Spec. cond. micromhos @ 25° C (lab.)	6,390	5,100	5,200	11,000	9,890
pH	7.7	8.1	7.8	7.8	7.9
Turbidity, Jackson units	--	370	300	75	--
Dissolved solids*	3,800	3,280	3,330	6,870	5,820
Boron (B)	0.24	0.12	0.28	0.14	.17
Calcium (Ca)	172	120	120	132	146
Magnesium (Mg)	37	45	53	59	67
Total Hardness ($CaCO_3$)	580	485	520	580	640
Sodium (Na)	1,220	1,100	970	2,325	(Na+K) 1,980
Potassium (K)	--	8	7.3	7.4	--
Chloride (Cl)	1,900	1,450	1,650	3,500	3,100
Sulfate(SO_4)	337	230	240	300	352
Alkalinity ($CaCO_3$)	204	250	200	170	213
Nitrate (N)	0.29	--	--	--	.4
Silica(SiO_2)	7.5	21.2	16.8	16.0	17.
Fluoride (F)	0.7	1.1	1.2	0.64	.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.:	862
Location:	Cimarron River near Buffalo, Oklahoma
Basin:	Arkansas River
Tributary to:	Arkansas River

Date collected:	2/25/60	3/29/60	4/4/60	5/25/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:40 am	10:50 am	1:30 pm	11:30 am	2:40 pm
Temperature of stream: °F	32	54	61	--	86
Discharge (cfs)	--	--	--	--	--
Spec. cond. micromhos @ 25° C (field)	15,000	13,100	2,910	--	6,500
Spec. cond. micromhos @ 25° C (lab.)	12,200	13,200	3,000	14,400	6,200
pH	8.1	7.6	8.1	7.6	7.7
Turbidity, Jackson units	110	400	--	241	230
Dissolved solids*	8,050	8,830	1,840	8,605	3,900
Boron (B)	0.22	0.36	0.20	.04	0.3
Calcium (Ca)	212	156	116	112	152
Magnesium (Mg)	75	44	34	29	61
Total Hardness ($CaCO_3$)	840	570	430	400	630
Sodium (Na)	2,850	3,450	465	3,175	1,100
Potassium (K)	11.2	12.7	7.6	10.2	10.5
Chloride (Cl)	4,050	4,650	750	4,900	1,850
Sulfate(SO_4)	550	250	275	250	225
Alkalinity ($CaCO_3$)	260	200	200	170	168
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	19.2	15.6	16.5	6.8	16.5
Fluoride (F)	1.1	0.7	0.80	.30	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 862
Location: Cimarron River near Buffalo, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/26/60	8/16/60	9/19/60	10/18/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:30 pm	2:30 pm	2:15 pm	9:00 am	3:00 am
Temperature of stream: $^{\circ}$F	93	87	80	55	60
Discharge (cfs)	--	20	--	266	72
Spec. cond. micromhos @ 25° C (field)	23,000	10,900	20,000	2,200	4,300
Spec. cond. micromhos @ 25° C (lab.)	21,000	10,300	19,600	2,280	4,100
pH	7.7	7.8	8.1	7.8	7.6
Turbidity, Jackson units	< 25	< 25	< 25	> 5,000	100
Dissolved solids*	14,000	6,860	13,240	1,290	2,320
Boron (B)	0.20	0.23	0.15	0.15	0.16
Calcium (Ca)	392	248	400	84	104
Magnesium (Mg)	97	63	87	19	19
Total Hardness ($CaCO_3$)	1,380	880	1,360	290	340
Sodium (Na)	4,400	2,380	4,350	330	795
Potassium (K)	13.8	10.2	8.8	7.9	7.5
Chloride (Cl)	7,500	3,550	7,250	138	1,080
Sulfate(SO_4)	900	850	1,075	138	255
Alkalinity ($CaCO_3$)	108	184	124	156	184
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	16.3	14.0	15.2	12.0	15.2
Fluoride (F)	--	0.6	1.0	0.6	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 862
Location: Cimarron River near Buffalo, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/27/60	1/9/61	1/25/61	2/13/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	3:40 pm	3:20 pm	1:45 pm	3:15 pm	8:40 am
Temperature of stream: °F	36	42	39	57	42
Discharge (cfs)	85	82	--	179	55
Spec. cond. micromhos @ 25° C (field)	4,500	--	6,200	7,900	4,200
Spec. cond. micromhos @ 25° C (lab.)	4,310	3,890	5,600	7,070	4,200
pH	7.4	8.2	7.5	7.6	7.6
Turbidity, Jackson units	--	--	--	300	--
Dissolved solids*	2,531	2,300	3,262	4,396	2,417
Boron (B)	.15	.31	.14	.09	.185
Calcium (Ca)	112	110	124	116	108
Magnesium (Mg)	39	48	46	41	58
Total Hardness ($CaCO_3$)	440	470	500	460	510
Sodium (Na)	775	652	900	1,225	635
Potassium (K)	6.2	--	6.9	7.9	6.5
Chloride (Cl)	1,200	1,020	1,625	2,250	1,100
Sulfate(SO_4)	230	233	313	67	298
Alkalinity ($CaCO_3$)	192	203	200	192	160
Nitrate (N)	--	.4	--	--	--
Silica(SiO_2)	15.0	15.	12.1	11.2	12.6
Fluoride (F)	.98	.7	.93	.85	.55

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 862
Location: Cimarron River near Buffalo, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/11/61	4/18/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	8:00 am	11:15 am	5:45 pm		
Temperature of stream: °F	48	59	77		
Discharge (cfs)	265	91	9		
Spec. cond. micromhos @ 25° C (field)	--	6,300	11,500		
Spec. cond. micromhos @ 25° C (lab.)	4,020	5,680	10.700		
pH	7.9	7.6	7.55		
Turbidity, Jackson units	--	> 25	< 25		
Dissolved solids*	2,370	3,503	6,506		
Boron (B)	.43	.13	.36		
Calcium (Ca)	106	128	200		
Magnesium (Mg)	52	53	68		
Total Hardness ($CaCO_3$)	480	540	780		
Sodium (Na)	676	938	2,275		
Potassium (K)	--	7.1	9.5		
Chloride (Cl)	1,050	1,650	3,300		
Sulfate(SO_4)	257	325	500		
Alkalinity ($CaCO_3$)	198	188	148		
Nitrate (N)	.1	--	--		
Silica(SiO_2)	17.	14.3	13.8		
Fluoride (F)	.7	1.07	.97		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 246
Location: Cimarron River near Mocane, Oklahoma
Basin: Arkansas River
Tributary to: --

Date collected:	10/27/59	12/8/59	12/22/59	1/26/60	2/17/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	9:30 am	9:00 am	9:30 am	5:35 pm	3:00 pm
Temperature of stream: °F	41	34	41	33	48
Discharge (cfs)	42	64	35	110	96
Spec. cond. micromhos @ 25° C (field)	--	2,800	2,200	2,050	--
Spec. cond. micromhos @ 25° C (lab.)	2,220	2,100	2,200	2,000	2,290
pH	7.3	8.2	7.7	8.0	8.2
Turbidity, Jackson units	--	230	200	150	--
Dissolved solids*	1,250	1,340	1,450	1,250	1,350
Boron (B)	0.32	0.26	0.21	0.10	0.15
Calcium (Ca)	78	95	96	72	93
Magnesium (Mg)	44	32	39	29	34
Total Hardness ($CaCO_3$)	375	370	400	300	370
Sodium (Na)	322	320	350	310	(Na+K) 342
Potassium (K)	--	5	5.6	4.8	--
Chloride (Cl)	500	510	575	500	515
Sulfate(SO_4)	168	170	200	145	166
Alkalinity ($CaCO_3$)	190	210	210	170	208
Nitrate (N)	0.59	--	--	--	0.9
Silica(SiO_2)	20	23.2	19.2	18.5	21.0
Fluoride (F)	0.9	0.8	1.6	0.84	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 246
Location: Cimarron River near Mocane, Oklahoma
Basin: Arkansas River
Tributary to: --

Date collected:	2/25/60	3/28/60	4/6/60	5/25/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:10 am	3:20 pm	2:40 pm	9:20 am	10:55 am
Temperature of stream: °F	32	69	77	--	81
Discharge (cfs)	70	45	64	52	24
Spec. cond. micromhos @ 25° C (field)	5,000	2,000	1,900	--	2,600
Spec. cond. micromhos @ 25° C (lab.)	4,000	2,100	2,200	2,300	2,500
pH	8.0	7.8	8.0	7.7	7.7
Turbidity, Jackson units	55	55	--	29	< 25
Dissolved solids*	2,600	1,390	1,380	1,422	1,535
Boron (B)	0.22	0.29	0.29	0.08	0.3
Calcium (Ca)	124	72	72	76	72
Magnesium (Mg)	63	51	41	41	41
Total Hardness ($CaCO_3$)	570	390	350	360	350
Sodium (Na)	750	400	310	360	360
Potassium (K)	9.0	7.0	6.7	6.6	6.5
Chloride (Cl)	1,080	510	490	620	620
Sulfate(SO_4)	310	150	210	185	150
Alkalinity ($CaCO_3$)	270	190	170	180	164
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	26.0	18.6	17.2	16.4	17.2
Fluoride (F)	1.3	0.5	1.14	0.85	1.10

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	246
Location:	Cimarron River near Mocane, Oklahoma
Basin:	Arkansas River
Tributary to:	--

Date collected:	7/26/60	8/16/60	9/19/60	10/18/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	1:45 pm	4:50 pm	4:25 pm	3:30 pm	9:15 am
Temperature of stream: °F	98	--	82	58	48
Discharge (cfs)	27	10	35	--	56
Spec. cond. micromhos @ 25° C (field)	2,700	2,750	2,800	2,600	2,300
Spec. cond. micromhos @ 25° C (lab.)	2,300	2,550	2,600	2,720	2,330
pH	7.9	8.1	8.0	7.5	7.6
Turbidity, Jackson units	68	< 25	73	85	140
Dissolved solids*	1,500	1,660	1,645	1,550	1,360
Boron (B)	0.25	0.24	0.18	0.15	0.19
Calcium (Ca)	64	72	80	88	96
Magnesium (Mg)	46	49	39	34	27
Total Hardness ($CaCO_3$)	350	380	360	360	350
Sodium (Na)	445	440	390	390	350
Potassium (K)	11.2	8.2	6.8	6.0	6.0
Chloride (Cl)	640	730	750	165	580
Sulfate(SO_4)	160	205	195	165	165
Alkalinity ($CaCO_3$)	140	176	152	196	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	15.4	17.1	17.2	17.2	16.4
Fluoride (F)	1.8	1.2	1.1	1.1	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 246
Location: Cimarron River near Mocane, Oklahoma
Basin: Arkansas River
Tributary to: --

Date collected:	12/27/60	1/9/61	1/23/61	2/14/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	4:45 pm	5:10 pm	3:20 pm	9:40 am	9:55 am
Temperature of stream: °F	34	44	47	42	45
Discharge (cfs)	40	--	74	45	74
Spec. cond. micromhos @ 25° C (field)	2,400	--	2,200	2,200	2,350
Spec. cond. micromhos @ 25° C (lab.)	2,390	2,330	2,220	2,170	2,300
pH	7.4	8.0	7.4	7.5	7.5
Turbidity, Jackson units	--	--	--	98	< 25
Dissolved solids*	1,365	1,350	1,290	1,344	1,314
Boron (B)	0.15	0.60	0.14	0.10	0.14
Calcium (Ca)	100	91	96	88	88
Magnesium (Mg)	29	40	29	44	36
Total Hardness ($CaCO_3$)	370	390	360	400	350
Sodium (Na)	325	352	318	275	305
Potassium (K)	5.3	--	5.8	6.2	5.0
Chloride (Cl)	510	550	520	490	540
Sulfate(SO_4)	190	163	175	50	170
Alkalinity ($CaCO_3$)	236	203	200	192	184
Nitrate (N)	--	1.2	--	--	--
Silica(SiO_2)	16.4	20.0	13.8	11.2	15.4
Fluoride (F)	1.04	0.9	1.15	0.64	1.12

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 246
Location: Cimarron River near Mocane, Oklahoma
Basin: Arkansas River
Tributary to: --

Date collected:	4/10/61	4/12/61	5/15/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	6:10 pm	5:50 am	4:30 pm		
Temperature of stream: °F	58	72	78		
Discharge (cfs)	45	65	--		
Spec. cond. micromhos @ 25° C (field)	--	2,350	800		
Spec. cond. micromhos @ 25° C (lab.)	2,360	2,208	2,200		
pH	8.2	7.7	7.4		
Turbidity, Jackson units	--	> 25	< 25		
Dissolved solids*	1,380	1,361	1,294		
Boron (B)	0.48	0.12	0.50		
Calcium (Ca)	81	84	84		
Magnesium (Mg)	38	39	36		
Total Hardness ($CaCO_3$)	480	370	360		
Sodium (Na)	676	285	325		
Potassium (K)	--	6.0	6.7		
Chloride (Cl)	1,050	540	510		
Sulfate(SO_4)	257	180	175		
Alkalinity ($CaCO_3$)	198	172	180		
Nitrate (N)	0.1	--	--		
Silica(SiO_2)	17.0	15.4	15.0		
Fluoride (F)	0.7	1.22	1.17		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 238
Location: Arkansas River at Ralston, Oklahoma
Basin: Arkansas River
Tributary to:

Date collected:	10/28/59	12/8/59	12/21/59	1/28/60	2/17/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	11:15 am	2:15 pm	3:15 pm	8:50 am	8:50 am
Temperature of stream: °F	53	44	67	39	--
Discharge (cfs)	5,900	2,620	4,300	3,300	5,750
Spec. cond. micromhos @ 25° C (field)	--	2,300	1,300	2,100	--
Spec. cond. micromhos @ 25° C (lab.)	1,800	2,050	1,480	2,100	1,780
pH	7.7	7.8	7.4	7.7	7.9
Turbidity, Jackson units	--	< 25	70	140	--
Dissolved solids*	1,020	1,390	1,000	1,300	1,080
Boron (B)	0.18	0.09	0.18	0.09	.16
Calcium (Ca)	112	145	10	120	106
Magnesium (Mg)	34	19	30	34	28
Total Hardness ($CaCO_3$)	420	440	400	440	380
Sodium (Na)	214	370	195	288	(Na+K) 235
Potassium (K)	--	5	4.8	4.8	--
Chloride (Cl)	340	410	290	430	340
Sulfate(SO_4)	172	200	140	230	219
Alkalinity ($CaCO_3$)	223	220	190	210	177
Nitrate (N)	1.0	--	--	--	1.2
Silica(SiO_2)	12	12.8	16.8	13.5	12.
Fluoride (F)	0.3	0.4	0.7	0.40	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 238
Location: Arkansas River at Ralston, Oklahoma
Basin: Arkansas River
Tributary to:

Date collected:	2/23/60	3/28/60	4/5/60	5/24/60	6/27/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:05 pm	3:00 pm	9:30 am	2:15 pm	1:45 pm
Temperature of stream: °F	61	72	50	60	84
Discharge (cfs)	4,680	19,100	9,800	3,800	5,450
Spec. cond. micromhos @ 25° C (field)	1,600	530	1,010	1,700	1,160
Spec. cond. micromhos @ 25° C (lab.)	1,750	570	1,140	1,800	1,150
pH	7.9	7.7	7.6	7.7	7.9
Turbidity, Jackson units	120	900	--	108	900
Dissolved solids*	1,166	365	768	1,109	719
Boron (B)	0.11	0.06	0.09	.039	0.2
Calcium (Ca)	124	56	100	100	72
Magnesium (Mg)	29	15	15	29	27
Total Hardness ($CaCO_3$)	430	200	310	370	290
Sodium (Na)	225	59	125	250	128
Potassium (K)	5.1	5.9	5.9	5.7	6.6
Chloride (Cl)	330	60	170	310	215
Sulfate(SO_4)	210	60	200	200	105
Alkalinity ($CaCO_3$)	220	120	180	190	128
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.2	13.0	12.3	9.7	11.2
Fluoride (F)	0.5	0.8	0.26	.30	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 238
Location: Arkansas River at Ralston, Oklahoma
Basin: Arkansas River
Tributary to:

Date collected:	7/26/60	8/15/60	9/19/60	10/17/60	11/16/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	8:45 am	4:00 pm	2:10 pm	1:30 pm	9:55 am
Temperature of stream: °F	83	84	82	66	55
Discharge (cfs)	7,550	3,200	2,280	7,160	2,200
Spec. cond. micromhos @ 25° C (field)	1,050	1,280	1,875	630	1,750
Spec. cond. micromhos @ 25° C (lab.)	880	--	1,800	650	1,820
pH	7.8	--	8.1	7.8	7.5
Turbidity, Jackson units	7,000	170	66	> 5,000	< 25
Dissolved solids*	596	--	1,135	350	1,090
Boron (B)	0.08	0.11	0.14	0.09	0.13
Calcium (Ca)	53	--	84	43	100
Magnesium (Mg)	19	--	44	11	24
Total Hardness ($CaCO_3$)	210	--	390	152	350
Sodium (Na)	138	--	265	70	240
Potassium (K)	5.0	--	6.0	4.1	6.2
Chloride (Cl)	190	245	435	105	395
Sulfate(SO_4)	100	105	165	52	188
Alkalinity ($CaCO_3$)	108	--	152	108	210
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	10.6	8.4	8.5	10.5	11.9
Fluoride (F)	0.2	--	0.4	0.2	0.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 238
Location: Arkansas River at Ralston, Oklahoma
Basin: Arkansas River
Tributary to:

Date collected:	12/29/60	1/9/61	1/23/61	2/13/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	9:00 am	1:50pm	2:10 pm	2:10 pm	3:00 pm
Temperature of stream: °F	37	40	82	52	56
Discharge (cfs)	2,120	1,870	2,280	1,620	1,870
Spec. cond. micromhos @ 25° C (field)	2,050	--	1,875	2,150	2,050
Spec. cond. micromhos @ 25° C (lab.)	2,107	2,280	1,800	1,970	2,220
pH	7.4	8.1	8.1	7.15	7.2
Turbidity, Jackson units	--	--	66	> 25	< 25
Dissolved solids*	1,209	1,350	1,135	1,228	1,249
Boron (B)	.12	.21	0.14	.15	.09
Calcium (Ca)	104	120	84	108	100
Magnesium (Mg)	32	35	44	31	41
Total Hardness ($CaCO_3$)	390	445	390	400	420
Sodium (Na)	258	315	265	260	305
Potassium (K)	5.0	--	6.0	5	5.5
Chloride (Cl)	385	490	435	450	370
Sulfate(SO_4)	155	194	165	195	185
Alkalinity ($CaCO_3$)	212	231	152	212	176
Nitrate (N)	--	1.1	--	--	--
Silica(SiO_2)	11.4	12	8.5	5.8	6.0
Fluoride (F)	.60	.3	0.4	.44	.71

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 238
Location: Arkansas River at Ralston, Oklahoma
Basin: Arkansas River
Tributary to:

Date collected:	4/12/61	4/19/61	5/17/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	11:35 am	11:05 am	10:50 am		
Temperature of stream: °F	41	63	69		
Discharge (cfs)	12,466	4,520	9,200		
Spec. cond. micromhos @ 25° C (field)	--	1,800	1,500		
Spec. cond. micromhos @ 25° C (lab.)	1,060	1,740	1,460		
pH	7.4	7.3	8.0		
Turbidity, Jackson units	--	88	200		
Dissolved solids*	659	1,057	911		
Boron (B)	.30	.12	.12		
Calcium (Ca)	86	104	100		
Magnesium (Mg)	18	24	29		
Total Hardness ($CaCO_3$)	290	360	370		
Sodium (Na)	114	230	85		
Potassium (K)	--	4.6	5.5		
Chloride (Cl)	170	360	280		
Sulfate(SO_4)	100	148	120		
Alkalinity ($CaCO_3$)	192	192	192		
Nitrate (N)	.1	--	--		
Silica(SiO_2)	11.	10.4	10.0		
Fluoride (F)	.4	.44	.45		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 236
Location: Salt Fork of the Arkansas River near Tonkawa, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/28/59	12/8/59	12/21/59	1/27/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	10:05 am	12:00 N	2:00 pm	5:05 pm	5:10 pm
Temperature of stream: °F	52	44	44	43	47
Discharge (cfs)	550	222	420	405	1,200
Spec. cond. micromhos @ 25° C (field)	--	4,000	3,600	4,200	--
Spec. cond. micromhos @ 25° C (lab.)	3,490	3,750	3,600	4,800	4,010
pH	7.7	8.0	7.6	7.6	7.7
Turbidity, Jackson units	--	< 25	< 25	450	--
Dissolved solids*	2,030	2,710	2,489	2,870	2,400
Boron (B)	0.18	0.09	0.64	0.19	0.19
Calcium (Ca)	121	155	98	144	148
Magnesium (Mg)	38	38	69	46	41
Total Hardness ($CaCO_3$)	460	545	530	550	540
Sodium (Na)	583	700	460	785	(Na+K) 661
Potassium (K)	--	6.0	3.7	5.9	--
Chloride (Cl)	900	950	1,050	1,270	1,000
Sulfate(SO_4)	275	220	350	375	391
Alkalinity ($CaCO_3$)	169	220	190	210	157
Nitrate (N)	0.36	--	--	--	0.4
Silica(SiO_2)	6.5	10.4	9.0	10.8	7.5
Fluoride (F)	0.3	0	0.3	0.20	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.:	**236**
Location:	**Salt Fork of the Arkansas River near Tonkawa, Oklahoma**
Basin:	**Arkansas River**
Tributary to:	**Arkansas River**

Date collected:	2/25/60	3/29/60	4/4/60	5/24/60	6/30/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	8:45 am	7:20 am	6:30 pm	4:00 pm	7:55 am
Temperature of stream: °F	32	60	60	83	76
Discharge (cfs)	650	1,020	770	238	210
Spec. cond. micromhos @ 25° C (field)	4,000	3,100	3,500	5,000	4,950
Spec. cond. micromhos @ 25° C (lab.)	3,400	3,450	3,800	4,600	4,400
pH	8.1	7.7	7.9	7.8	7.5
Turbidity, Jackson units	60	< 25	--	75	< 25
Dissolved solids*	2,380	2,350	2,315	3,185	2,770
Boron (B)	0.09	0.13	0.13	0.10	0.5
Calcium (Ca)	155	172	184	184	136
Magnesium (Mg)	41	53	44	66	41
Total Hardness ($CaCO_3$)	560	650	640	730	510
Sodium (Na)	720	515	600	885	755
Potassium (K)	5.3	6.1	6.0	6.6	7.1
Chloride (Cl)	890	800	800	1,250	1,220
Sulfate(SO_4)	375	560	550	700	300
Alkalinity ($CaCO_3$)	190	160	170	190	168
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	8.4	10.6	9.6	8.4	9.5
Fluoride (F)	0.6	0.9	0.25	0.75	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 236
Location: Salt Fork of the Arkansas River near Tonkawa, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/26/60	8/15/60	9/19/60	10/17/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:15 am	5:20 pm	3:25 pm	1:10 pm	2:50 pm
Temperature of stream: °F	85	83	82	64	63
Discharge (cfs)	1,260	366	435	785	334
Spec. cond. micromhos @ 25° C (field)	2,300	5,700	4,000	2,400	4,500
Spec. cond. micromhos @ 25° C (lab.)	2,000	5,000	3,800	2,600	4,200
pH	7.6	7.8	7.8	7.2	7.6
Turbidity, Jackson units	> 5,000	49	< 25	> 5,000	38
Dissolved solids*	1,310	3,100	2,200	1,450	2,400
Boron (B)	0.16	0.15	0.18	0.12	0.14
Calcium (Ca)	72	140	108	69	116
Magnesium (Mg)	24	41	39	24	39
Total Hardness ($CaCO_3$)	280	520	430	270	450
Sodium (Na)	360	1,000	625	390	725
Potassium (K)	6.2	6.5	2.3	6.5	6.5
Chloride (Cl)	600	1,500	1,050	670	1,090
Sulfate(SO_4)	118	415	290	200	288
Alkalinity ($CaCO_3$)	100	140	164	96	200
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	10.6	9.4	10.0	9.7	9.2
Fluoride (F)	0.3	0.4	0.6	0.4	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 236
Location: Salt Fork of the Arkansas River near Tonkawa, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/27/60	1/9/61	1/23/61	2/15/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	1:45 pm	3:35 pm	3:40 pm	1:35 pm	4:20 pm
Temperature of stream: °F	38	41	38	53	58
Discharge (cfs)	370	270	252	329	135
Spec. cond. micromhos @ 25° C (field)	4,400	--	4,700	4,300	4,700
Spec. cond. micromhos @ 25° C (lab.)	4,260	4,110	4,350	3,750	4,600
pH	7.5	8.0	7.5	7.6	7.8
Turbidity, Jackson units	--	--	--	> 25	< 25
Dissolved solids*	2,502	2,510	2,681	2,457	2,717
Boron (B)	0.12	0.82	0.155	0.15	0.09
Calcium (Ca)	132	144	152	132	128
Magnesium (Mg)	44	41	39	44	49
Total Hardness ($CaCO_3$)	510	530	540	510	520
Sodium (Na)	706	716	675	690	700
Potassium (K)	5.3	--	4.9	5.0	5.3
Chloride (Cl)	1,000	1,050	1,210	1,000	1,180
Sulfate(SO_4)	362	365	413	360	375
Alkalinity ($CaCO_3$)	216	225	224	200	196
Nitrate (N)	--	0.0	--	--	--
Silica(SiO_2)	9.0	7.4	6.6	4.8	6.2
Fluoride (F)	0.48	0.4	0.10	0.49	0.66

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 236
Location: Salt Fork of the Arkansas River near Tonkawa, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/12/61	4/19/61	5/17/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	1:40 pm	5:15 pm	11:15 am		
Temperature of stream: °F	47	74	70		
Discharge (cfs)	975	500	1,240		
Spec. cond. micromhos @ 25° C (field)	--	5,100	3,800		
Spec. cond. micromhos @ 25° C (lab.)	3,600	4,800	4,000		
pH	7.9	7.8	7.2		
Turbidity, Jackson units	--	82	180		
Dissolved solids*	2,120	3,040	2,255		
Boron (B)	0.30	0.29	0.10		
Calcium (Ca)	104	148	132		
Magnesium (Mg)	49	49	39		
Total Hardness ($CaCO_3$)	460	680	490		
Sodium (Na)	582	720	650		
Potassium (K)	--	5.0	6.8		
Chloride (Cl)	900	1,300	1,000		
Sulfate(SO_4)	305	450	325		
Alkalinity ($CaCO_3$)	136	176	148		
Nitrate (N)	0.3	--	--		
Silica(SiO_2)	7.2	--	7.1		
Fluoride (F)	0.5	--	0.55		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 235
Location: **Salt Fork of the Arkansas River near Jet, Oklahoma**
Basin: **Arkansas River**
Tributary to: **Arkansas River**

Date collected:	10/26/59	12/8/59	12/21/59	1/27/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	10:30 am	12:45 pm	3:45 pm	3:45 pm
Temperature of stream: °F	60	40	44	38	41
Discharge (cfs)	341	148	258	258	837
Spec. cond. micromhos @ 25° C (field)	--	4,200	5,100	5,000	--
Spec. cond. micromhos @ 25° C (lab.)	3,460	4,000	4,800	5,100	4,080
pH	7.4	7.7	7.6	7.5	8.0
Turbidity, Jackson units	--	30	< 25	< 25	--
Dissolved solids*	2,000	2,660	3,225	3,490	2,450
Boron (B)	0.17	0.09	0.52	0.18	0.04
Calcium (Ca)	118	175	160	160	172
Magnesium (Mg)	35	30	39	49	37
Total Hardness ($CaCO_3$)	440	555	560	600	580
Sodium (Na)	576	900	890	985	(Na+K) 680
Potassium (K)	--	7	6.3	6.1	--
Chloride (Cl)	900	1,100	1,500	1,380	1,050
Sulfate(SO_4)	303	320	350	450	412
Alkalinity ($CaCO_3$)	105	150	140	160	148
Nitrate (N)	0.36	--	--	--	0.1
Silica(SiO_2)	4.0	10.8	8.2	9.0	15.0
Fluoride (F)	0.3	0	0.5	0.28	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 235
Location: **Salt Fork of the Arkansas River near Jet, Oklahoma**
Basin: **Arkansas River**
Tributary to: **Arkansas River**

Date collected:	2/23/60	3/29/60	4/4/60	5/26/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:15 pm	8:30 am	4:50 pm	3:40 pm	8:45 am
Temperature of stream: °F	34	57	56	78	78
Discharge (cfs)	620	775	458	163	192
Spec. cond. micromhos @ 25° C (field)	3,700	3,400	4,000	6,100	5,200
Spec. cond. micromhos @ 25° C (lab.)	3,750	3,600	4,200	5,600	5,000
pH	8.0	7.6	7.9	7.6	7.4
Turbidity, Jackson units	40	< 25	--	< 25	< 25
Dissolved solids*	2,780	2,450	2,625	3,755	3,060
Boron (B)	0.09	0.12	0.12	0.11	3.6
Calcium (Ca)	152	188	184	224	152
Magnesium (Mg)	46	49	63	61	46
Total Hardness ($CaCO_3$)	380	670	720	810	570
Sodium (Na)	800	525	660	1,125	845
Potassium (K)	5.7	6.3	5.3	6.7	7.5
Chloride (Cl)	1,000	790	920	1,510	1,360
Sulfate(SO_4)	425	500	700	800	300
Alkalinity ($CaCO_3$)	140	150	130	130	124
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	7.4	10.4	8.2	6.6	9.7
Fluoride (F)	0.5	0.9	0.10	0.81	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 235
Location: Salt Fork of the Arkansas River near Jet, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/27/60	8/15/60	9/20/60	10/19/60	11/14/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:15 pm	7:00 pm	9:45 pm	11:10 am	4:25 pm
Temperature of stream: °F	83	78	72	58	53
Discharge (cfs)	422	163	125	627	206
Spec. cond. micromhos @ 25° C (field)	5,800	5,100	5,200	5,300	5,200
Spec. cond. micromhos @ 25° C (lab.)	4,800	4,500	4,600	5,250	4,950
pH	7.5	7.8	7.9	7.0	7.5
Turbidity, Jackson units	40	< 25	< 25	52	35
Dissolved solids*	3,280	2,860	2,820	3,055	2,850
Boron (B)	0.21	0.16	0.15	0.15	0.12
Calcium (Ca)	132	168	136	128	128
Magnesium (Mg)	44	36	39	36	36
Total Hardness ($CaCO_3$)	510	570	500	470	470
Sodium (Na)	1,206	900	800	900	900
Potassium (K)	7.2	6.8	2.5	7.4	6.8
Chloride (Cl)	1,560	1,300	1,380	1,440	1,350
Sulfate(SO_4)	425	490	390	400	375
Alkalinity ($CaCO_3$)	96	92	100	120	120
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.8	8.1	8.4	8.0	7.1
Fluoride (F)	0.2	0.4	0.4	0.4	0.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: **235**
Location: **Salt Fork of the Arkansas River near Jet, Oklahoma**
Basin: **Arkansas River**
Tributary to: **Arkansas River**

Date collected:	12/27/60	1/10/61	1/23/61	2/15/61	3/13/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	3:10 pm	8:30 am	5:00 pm	11:05 am	5:50 pm
Temperature of stream: °F	38	37	39	43	51
Discharge (cfs)	--	190	145	243	117
Spec. cond. micromhos @ 25° C (field)	5,400	--	5,300	6,100	5,100
Spec. cond. micromhos @ 25° C (lab.)	5,040	4,930	5,000	5,600	5,000
pH	7.4	7.7	7.3	7.45	7.55
Turbidity, Jackson units	--	--	--	725	< 25
Dissolved solids*	3,064	3,040	3,087	3,995	3,059
Boron (B)	0.12	0.59	0.18	0.17	0.06
Calcium (Ca)	144	156	152	160	156
Magnesium (Mg)	41	49	49	56	80
Total Hardness ($CaCO_3$)	530	590	580	630	720
Sodium (Na)	825	857	794	938	800
Potassium (K)	6.5	--	5.5	6.2	5.8
Chloride (Cl)	1,350	1,300	1,375	1,600	1,300
Sulfate(SO_4)	412	429	463	475	462
Alkalinity ($CaCO_3$)	148	171	164	164	148
Nitrate (N)	--	0.9	--	--	--
Silica(SiO_2)	7.8	9.0	7.3	6.4	5.3
Fluoride (F)	0.37	0.4	0.11	0.49	0.55

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.
* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 235
Location: Salt Fork of the Arkansas River near Jet, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/11/61	4/18/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	11:45 am	4:15 pm	10:00 am		
Temperature of stream: °F	50	58	62		
Discharge (cfs)	569	302	705		
Spec. cond. micromhos @ 25° C (field)	--	6,150	4,250		
Spec. cond. micromhos @ 25° C (lab.)	5,850	5,472	6,800		
pH	7.9	7.5	7.35		
Turbidity, Jackson units	--	> 25	> 25		
Dissolved solids*	3,590	3,459	3,490		
Boron (B)	0.40	0.29	0.15		
Calcium (Ca)	153	168	38		
Magnesium (Mg)	58	63	20		
Total Hardness ($CaCO_3$)	620	1,100	180		
Sodium (Na)	1,080	820	50		
Potassium (K)	--	5.5	3.9		
Chloride (Cl)	1,650	1,500	104		
Sulfate(SO_4)	480	519	22		
Alkalinity ($CaCO_3$)	139	144	140		
Nitrate (N)	0.1	--	--		
Silica(SiO_2)	5.6	--	7.3		
Fluoride (F)	0.3	--	0.40		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 232
Location: Medicine Lodge River near Kiowa, Kansas
Basin: Arkansas River
Tributary to: Salt Fork of the Arkansas River

Date collected:	10/26/59	12/8/59	12/21/59	1/27/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	1:15 pm	9:30 am	11:30 am	3:10 pm	2:40 pm
Temperature of stream: °F	60	39	38	38	--
Discharge (cfs)	97	84	88	188	175
Spec. cond. micromhos @ 25° C (field)	--	1,060	900	850	--
Spec. cond. micromhos @ 25° C (lab.)	1,110	960	1,100	860	1,300
pH	7.9	8.0	8.2	7.8	8.2
Turbidity, Jackson units	--	40	< 25	200	--
Dissolved solids*	757	730	700	625	958
Boron (B)	0.19	0.04	0.12	0.90	0.18
Calcium (Ca)	143	130	124	120	186
Magnesium (Mg)	29	25	29	29	38
Total Hardness ($CaCO_3$)	475	430	430	420	620
Sodium (Na)	69	90	60	45	(Na+K) 65
Potassium (K)	--	4	5.9	3.1	--
Chloride (Cl)	75	60	60	50	75
Sulfate(SO_4)	301	220	250	235	424
Alkalinity ($CaCO_3$)	207	180	170	170	210
Nitrate (N)	0.38	0.4	--	--	0.6
Silica(SiO_2)	16.0	17.2	14.4	17.0	10.0
Fluoride (F)	0.3	0.2	1.2	0.24	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 232
Location: Medicine Lodge River near Kiowa, Kansas
Basin: Arkansas River
Tributary to: Salt Fork of the Arkansas River

Date collected:	2/23/60	3/29/60	4/4/60	5/25/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	1:55 pm	9:30 am	3:20 pm	5:00 pm	1:30 pm
Temperature of stream: °F	32	57	65	85	90
Discharge (cfs)	130	210	166	74	58
Spec. cond. micromhos @ 25° C (field)	1,200	1,400	1,200	1,230	1,300
Spec. cond. micromhos @ 25° C (lab.)	1,400	1,500	1,550	1,140	1,200
pH	8.1	7.7	7.8	7.9	7.9
Turbidity, Jackson units	70	146	--	< 25	< 25
Dissolved solids*	1,090	1,240	1,163	920	933
Boron (B)	0.09	0.12	0.15	0.08	0.11
Calcium (Ca)	190	272	248	136	188
Magnesium (Mg)	44	20	29	39	19
Total Hardness ($CaCO_3$)	650	760	740	500	550
Sodium (Na)	75	82	79	75	54
Potassium (K)	4.2	5.3	5.0	4.6	5.2
Chloride (Cl)	70	65	90	85	90
Sulfate(SO_4)	500	580	480	370	385
Alkalinity ($CaCO_3$)	200	190	220	140	132
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	14.2	15.2	15.4	12.8	15.2
Fluoride (F)	0.5	0.6	0.25	0.33	0.74

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 232
Location: Medicine Lodge River near Kiowa, Kansas
Basin: Arkansas River
Tributary to: Salt Fork of the Arkansas River

Date collected:	7/27/60	8/16/60	9/20/60	10/19/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:40 am	12:20 pm	2:10 pm	8:30 am	9:00 am
Temperature of stream: °F	84	82	81	51	55
Discharge (cfs)	45	13	10	184	75
Spec. cond. micromhos @ 25° C (field)	1,300	1,500	1,300	600	925
Spec. cond. micromhos @ 25° C (lab.)	1,020	1,300	1,230	690	950
pH	7.7	8.2	8.0	7.6	7.5
Turbidity, Jackson units	190	52	< 25	5,000	45
Dissolved solids*	840	1,000	935	430	635
Boron (B)	0.13	0.28	0.23	0.14	0.10
Calcium (Ca)	164	172	148	88	128
Magnesium (Mg)	34	44	41	12	22
Total Hardness ($CaCO_3$)	550	610	540	270	410
Sodium (Na)	65	90	75	23	55
Potassium (K)	6.0	5.3	5.5	5.8	3.8
Chloride (Cl)	66	110	120	34	68
Sulfate(SO_4)	370	500	400	140	212
Alkalinity ($CaCO_3$)	148	124	152	140	224
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.0	14.6	13.2	12.0	15.2
Fluoride (F)	0.2	0.4	Trace	0.6	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 232
Location: Medicine Lodge River near Kiowa, Kansas
Basin: Arkansas River
Tributary to: Salt Fork of the Arkansas River

Date collected:	12/28/60	1/10/61	1/24/61	2/14/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	7:25 am	10:50 am	9:10 am	3:35 pm	8:20 am
Temperature of stream: °F	33	34	32	54	42
Discharge (cfs)	93	86	84	122	82
Spec. cond. micromhos @ 25° C (field)	950	--	830	1,080	948
Spec. cond. micromhos @ 25° C (lab.)	920	945	940	1,020	960
pH	7.5	8.0	7.4	7.5	7.85
Turbidity, Jackson units	--	--	--	50	--
Dissolved solids*	634	668	647	721	647
Boron (B)	0.12	0.21	0.055	0.10	0.135
Calcium (Ca)	116	121	120	132	108
Magnesium (Mg)	29	34	22	29	29
Total Hardness ($CaCO_3$)	410	440	390	450	390
Sodium (Na)	42	40	52	55	45
Potassium (K)	3.4	--	3.1	4.2	3.4
Chloride (Cl)	58	64	62	72	68
Sulfate(SO_4)	200	225	230	265	220
Alkalinity ($CaCO_3$)	196	198	196	192	180
Nitrate (N)	--	0.7	--	--	--
Silica(SiO_2)	14.5	10.0	12.5	11.4	16.2
Fluoride (F)	0.54	0.5	0.59	.44	.60

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 232
Location: Medicine Lodge River near Kiowa, Kansas
Basin: Arkansas River
Tributary to: Salt Fork of the Arkansas River

Date collected:	4/11/61	4/18/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	2:30 pm	--	12:15 pm		
Temperature of stream: °F	57	70	69		
Discharge (cfs)	160	101	48		
Spec. cond. micromhos @ 25° C (field)	--	1,040	1,100		
Spec. cond. micromhos @ 25° C (lab.)	1,190	1,056	1,163		
pH	8.4	7.7	7.4		
Turbidity, Jackson units	--	> 25	> 25		
Dissolved solids*	869	721	754		
Boron (B)	0.31	0.29	0.20		
Calcium (Ca)	157	128	132		
Magnesium (Mg)	32	17	29		
Total Hardness ($CaCO_3$)	525	390	450		
Sodium (Na)	70	40	60		
Potassium (K)	--	3.4	4.2		
Chloride (Cl)	80	68	84		
Sulfate(SO_4)	353	280	285		
Alkalinity ($CaCO_3$)	194	180	164		
Nitrate (N)	0.3	--	--		
Silica(SiO_2)	15.0	4.6	12.1		
Fluoride (F)	0.5	0.23	0.76		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 764
Location: Salt Fork of Arkansas River near Winchester, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/26/59	12/7/59	12/21/59	1/27/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	5:30 pm	10:55 am	2:35 pm	1:35 pm
Temperature of stream: °F	--	47	36	36	47
Discharge (cfs)	--	--	--	--	--
Spec. cond. micromhos @ 25° C (field)	--	2,800	2,100	1,700	--
Spec. cond. micromhos @ 25° C (lab.)	2,370	2,300	2,000	1,650	2,320
pH	7.5	7.8	7.7	7.8	8.1
Turbidity, Jackson units	--	< 25	< 25	270	--
Dissolved solids*	1,680	1,890	1,693	1,320	1,760
Boron (B)	0.24	0.09	0.24	0.15	0.11
Calcium (Ca)	312	290	258	244	168
Magnesium (Mg)	47	45	50	15	134
Total Hardness ($CaCO_3$)	497	910	850	670	970
Sodium (Na)	175	250	175	105	(Na+K) 181
Potassium (K)	--	5.0	4.3	3.5	--
Chloride (Cl)	305	305	265	105	270
Sulfate(SO_4)	734	660	725	575	775
Alkalinity ($CaCO_3$)	159	140	130	140	174
Nitrate (N)	0.00	--	--	--	0.2
Silica(SiO_2)	12.0	18.0	15.8	16.1	12.0
Fluoride (F)	0.3	0.6	0.9	0.24	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.
* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 764
Location: Salt Fork of Arkansas River near Winchester, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/23/60	3/29/60	4/4/60	5/26/60	6/28/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:15 pm	10:00 am	2:45 pm	7:15 am	12:00 N
Temperature of stream: °F	32	57	65	64	88
Discharge (cfs)	--	--	--	--	--
Spec. cond. micromhos @ 25° C (field)	2,450	2,000	2,090	2,600	2,610
Spec. cond. micromhos @ 25° C (lab.)	2,150	2,200	2,400	2,500	2,500
pH	7.9	7.9	8.1	7.6	7.7
Turbidity, Jackson units	70	220	--	650	< 25
Dissolved solids*	1,760	1,872	1,878	1,990	2,120
Boron (B)	0.10	0.11	0.12	0.08	0.2
Calcium (Ca)	270	320	312	280	344
Magnesium (Mg)	58	65	73	78	58
Total Hardness ($CaCO_3$)	920	1,070	1,080	1,020	1,100
Sodium (Na)	160	140	173	283	185
Potassium (K)	4.4	5.7	12.0	6.3	6.7
Chloride (Cl)	210	185	235	350	270
Sulfate(SO_4)	700	825	1,050	900	875
Alkalinity ($CaCO_3$)	170	140	130	160	124
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	14.6	16.4	16.5	16.4	15.0
Fluoride (F)	0.5	0.8	0.0	0.00	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 764
Location: Salt Fork of Arkansas River near Winchester, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/27/60	8/16/60	9/20/60	10/19/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:30 am	8:15 am	3:30 pm	9:50 am	8:00 pm
Temperature of stream: °F	84	72	81	48	53
Discharge (cfs)	0.8	4.0	2.5	107	28
Spec. cond. micromhos @ 25° C (field)	2,500	2,500	2,400	1,250	2,200
Spec. cond. micromhos @ 25° C (lab.)	2,000	2,200	2,280	1,340	2,280
pH	7.5	7.8	7.9	7.1	7.7
Turbidity, Jackson units	600	< 25	< 25	> 5,000	< 25
Dissolved solids*	1,970	1,890	2,060	1,045	1,710
Boron (B)	0.16	0.34	0.35	0.15	0.19
Calcium (Ca)	332	328	368	208	272
Magnesium (Mg)	56	78	73	29	53
Total Hardness ($CaCO_3$)	1,060	1,140	1,220	640	900
Sodium (Na)	158	140	120	54	195
Potassium (K)	6.5	7.3	2.3	6.0	5.0
Chloride (Cl)	200	190	185	90	175
Sulfate(SO_4)	900	1,025	1,075	500	800
Alkalinity ($CaCO_3$)	192	136	140	96	136
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.0	14.5	17.2	11.0	13.2
Fluoride (F)	0.2	0.2	0.8	0.4	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 764
Location: Salt Fork of Arkansas River near Winchester, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/27/60	1/10/61	1/24/61	2/14/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	4:30 pm	10:15 am	8:25 am	4:25 pm	7:45 am
Temperature of stream: °F	35	33	32	55	40
Discharge (cfs)	34	24	13	85	32
Spec. cond. micromhos @ 25° C (field)	2,200	--	2,400	1,930	2,400
Spec. cond. micromhos @ 25° C (lab.)	2,070	2,400	2,420	1,850	2,400
pH	7.6	7.8	7.5	7.55	7.65
Turbidity, Jackson units	--	--	--	106	< 25
Dissolved solids*	1,571	1,810	1,834	1,426	1,730
Boron (B)	0.18	1.0	0.155	0.15	0.06
Calcium (Ca)	264	292	272	252	260
Magnesium (Mg)	49	49	51	43	56
Total Hardness ($CaCO_3$)	860	930	890	810	880
Sodium (Na)	151	208	213	115	195
Potassium (K)	4.0	--	3.9	4.5	4.1
Chloride (Cl)	215	285	335	165	310
Sulfate(SO_4)	775	784	800	725	738
Alkalinity ($CaCO_3$)	140	162	152	144	124
Nitrate (N)	--	0.1	--	--	--
Silica(SiO_2)	13.6	15.0	12.8	10.8	11.4
Fluoride (F)	0.48	0.5	0.10	0.39	0.55

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 764
Location: Salt Fork of Arkansas River near Winchester, Oklahoma
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/11/61	4/18/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	1:45 pm	5:25 pm	11:30 am		
Temperature of stream: $^{\circ}$F	58	71	69		
Discharge (cfs)	138	60	25		
Spec. cond. micromhos @ 25° C (field)	--	2,550	2,750		
Spec. cond. micromhos @ 25° C (lab.)	2,000	2,400	2,800		
pH	8.4	7.7	7.5		
Turbidity, Jackson units	--	> 25	> 25		
Dissolved solids*	1,600	1,918	2,118		
Boron (B)	0.40	0.33	0.20		
Calcium (Ca)	282	312	344		
Magnesium (Mg)	62	78	68		
Total Hardness ($CaCO_3$)	960	940	1,140		
Sodium (Na)	121	180	220		
Potassium (K)	--	4.5	6.0		
Chloride (Cl)	165	280	320		
Sulfate(SO_4)	798	825	925		
Alkalinity ($CaCO_3$)	157	120	120		
Nitrate (N)	0.2	--	--		
Silica(SiO_2)	17	--	13.2		
Fluoride (F)	0.5	--	0.45		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 229
Location: Walnut River at Winfield, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	10/28/59	12/9/59	12/23/59	1/28/60	2/17/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	8:20 am	9:30 am	9:20 am	9:45 am	10:05 am
Temperature of stream: $^{\circ}$F	53	40	41	35	--
Discharge (cfs)	446	250	250	999	524
Spec. cond. micromhos @ 25° C (field)	--	1,800	1,600	1,100	--
Spec. cond. micromhos @ 25° C (lab.)	1,400	1,650	1,500	1,300	1,050
pH	7.8	7.7	7.8	7.8	8.1
Turbidity, Jackson units	--	< 25	< 25	< 25	--
Dissolved solids*	793	1,120	1,080	785	632
Boron (B)	0.17	0.04	0.12	0.06	0.16
Calcium (Ca)	139	155	134	120	110
Magnesium (Mg)	29	38	69	29	21
Total Hardness ($CaCO_3$)	465	545	620	420	360
Sodium (Na)	112	160	140	75	(Na+K) 77
Potassium (K)	--	3	2.8	3.3	--
Chloride (Cl)	225	280	290	200	158
Sulfate(SO_4)	90	160	190	100	75
Alkalinity ($CaCO_3$)	287	280	190	230	220
Nitrate (N)	2.7	--	--	--	1.4
Silica(SiO_2)	14	5.2	4.2	14.4	6.5
Fluoride (F)	0.3	0.1	0.4	0.10	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 229
Location: Walnut River at Winfield, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/24/60	3/29/60	4/5/60	5/25/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:25 pm	9:30 am	8:55 am	7:45 am	3:40 pm
Temperature of stream: °F	33	58	52	75	85
Discharge (cfs)	446	1,080	859	368	212
Spec. cond. micromhos @ 25° C (field)	1,600	710	1,200	1,430	1,000
Spec. cond. micromhos @ 25° C (lab.)	1,200	750	820	1,460	970
pH	8.1	7.9	7.9	7.9	7.7
Turbidity, Jackson units	< 25	160	--	< 25	27
Dissolved solids*	827	506	462	895	670
Boron (B)	0.02	0.06	0.08	0.04	0.05
Calcium (Ca)	76	88	96	132	92
Magnesium (Mg)	27	15	17	36	27
Total Hardness ($CaCO_3$)	400	280	310	480	340
Sodium (Na)	115	57	61	133	75
Potassium (K)	2.8	3.9	2.7	3.0	4.4
Chloride (Cl)	190	105	105	250	155
Sulfate(SO_4)	130	45	65	155	130
Alkalinity ($CaCO_3$)	210	190	170	230	156
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.7	12.2	14.8	9.4	9.1
Fluoride (F)	0.5	0.9	0.30	0.17	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 229
Location: Walnut River at Winfield, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	7/26/60	8/18/60	9/19/60	10/18/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:40 pm	1:30 pm	5:30 pm	7:10 am	5:10 pm
Temperature of stream: °F	85	81	79	65	57
Discharge (cfs)	201	264	101	232	197
Spec. cond. micromhos @ 25° C (field)	800	740	1,480	1,700	1,150
Spec. cond. micromhos @ 25° C (lab.)	660	670	1,350	1,840	1,190
pH	7.7	8.0	7.8	7.5	7.6
Turbidity, Jackson units	40	71	< 25	25	< 25
Dissolved solids*	455	380	845	1,150	701
Boron (B)	0.08	0.23	1.14	0.17	0.10
Calcium (Ca)	74	80	136	176	112
Magnesium (Mg)	18	19	27	53	32
Total Hardness ($CaCO_3$)	260	280	450	660	410
Sodium (Na)	62	55	115	138	85
Potassium (K)	3.8	4.0	4.4	4.6	5.5
Chloride (Cl)	100	90	260	300	190
Sulfate(SO_4)	36	56	198	188	120
Alkalinity ($CaCO_3$)	176	164	168	288	176
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	8.8	11.0	4.8	9.2	--
Fluoride (F)	0.8	0.4	0.3	0.6	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 229
Location: Walnut River at Winfield, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	12/28/60	1/11/61	1/25/61	2/13/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	3:10 pm	11:15 am	10:30 am	5:35 pm	4:05 pm
Temperature of stream: °F	37	38	33	43	55
Discharge (cfs)	201	164	77	176	268
Spec. cond. micromhos @ 25° C (field)	1,290	--	1,850	1,850	1,500
Spec. cond. micromhos @ 25° C (lab.)	1,215	1,670	1,800	1,700	1,510
pH	7.3	8.1	7.6	7.45	7.8
Turbidity, Jackson units	--	--	--	> 25	--
Dissolved solids*	737	1,030	1,052	992	894
Boron (B)	0.10	0.36	0.105	0.14	0.165
Calcium (Ca)	120	160	164	148	132
Magnesium (Mg)	29	42	44	46	36
Total Hardness ($CaCO_3$)	420	570	590	560	480
Sodium (Na)	75	93	151	135	130
Potassium (K)	4.1	--	3.0	3.0	3.8
Chloride (Cl)	170	270	310	300	260
Sulfate(SO_4)	150	112	245	225	165
Alkalinity ($CaCO_3$)	216	271	208	204	208
Nitrate (N)	--	1.0	--	--	--
Silica(SiO_2)	11.0	8.0	2.6	7.4	6.2
Fluoride (F)	0.37	0.4	0.59	0.49	0.50

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 229
Location: Walnut River at Winfield, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/12/61	4/17/61	5/17/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	10:30 am	2:15 pm	9:15 am		
Temperature of stream: °F	45	61	66		
Discharge (cfs)	3,020	--	741		
Spec. cond. micromhos @ 25° C (field)	--	920	1,200		
Spec. cond. micromhos @ 25° C (lab.)	411	864	1,266		
pH	7.5	7.5	7.2		
Turbidity, Jackson units	--	> 25	> 25		
Dissolved solids*	259	530	700		
Boron (B)	0.31	27	0.10		
Calcium (Ca)	51	96	108		
Magnesium (Mg)	8.0	17	24		
Total Hardness ($CaCO_3$)	160	310	370		
Sodium (Na)	21	50	90		
Potassium (K)	--	3.0	3.2		
Chloride (Cl)	33	115	170		
Sulfate(SO_4)	25	78	100		
Alkalinity ($CaCO_3$)	131	192	224		
Nitrate (N)	0.4	--	--		
Silica(SiO_2)	12	10.3	10.3		
Fluoride (F)	0.6	1.12	0.55		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 227
Location: Arkansas River at Arkansas City, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	10/28/59	12/9/59	12/23/59	1/28/60	2/17/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	9:00 am	10:10 am	9:45 am	10:10 am	1:45 pm
Temperature of stream: °F	48	40	68	35	--
Discharge (cfs)	1,560	1,110	1,160	1,980	2,120
Spec. cond. micromhos @ 25° C (field)	--	2,500	2,100	1,650	--
Spec. cond. micromhos @ 25° C (lab.)	2,030	2,100	2,200	1,850	1,870
pH	7.6	7.5	7.6	7.6	8.2
Turbidity, Jackson units	--	30	25	180	--
Dissolved solids*	1,200	1,480	1,480	1,160	1,190
Boron (B)	0.15	0.14	0.18	0.75	.23
Calcium (Ca)	124	140	136	108	117
Magnesium (Mg)	37	42	41	46	30
Total Hardness ($CaCO_3$)	460	525	510	460	415
Sodium (Na)	252	310	290	230	(Na+K) 258
Potassium (K)	--	7	6.5	5.3	--
Chloride (Cl)	355	380	380	310	312
Sulfate(SO_4)	277	280	600	245	315
Alkalinity ($CaCO_3$)	212	210	220	200	197
Nitrate (N)	1.87	--	--	--	2.5
Silica(SiO_2)	16	16.4	14.2	16.4	10
Fluoride (F)	0.5	0.4	0.7	0.36	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 227
Location: Arkansas River at Arkansas City, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	2/24/60	3/29/60	4/5/60	5/24/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	4:00 pm	10:00 am	9:35 am	6:00 pm	4:35 pm
Temperature of stream: °F	32	76	52	80	86
Discharge (cfs)	1,380	16,000	4,790	2,060	1,780
Spec. cond. micromhos @ 25° C (field)	2,200	460	1,200	1,650	1,700
Spec. cond. micromhos @ 25° C (lab.)	2,250	520	1,360	1,550	1,700
pH	8.0	7.8	7.6	7.9	7.6
Turbidity, Jackson units	85	800	--	350	180
Dissolved solids*	1,466	364	870	970	1,105
Boron (B)	.10	0.05	0.11	.05	0.2
Calcium (Ca)	135	56	116	100	112
Magnesium (Mg)	51	15	19	22	27
Total Hardness ($CaCO_3$)	550	200	370	340	390
Sodium (Na)	310	52	127	207	205
Potassium (K)	6.5	7.0	7.6	6.5	8.7
Chloride (Cl)	395	50	165	285	290
Sulfate(SO_4)	250	68	260	180	232
Alkalinity ($CaCO_3$)	210	120	180	200	176
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	15.2	13.0	14.0	13.2	15.6
Fluoride (F)	0.6	0.9	0.30	.58	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 227
Location: Arkansas River at Arkansas City, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	12/28/60	1/11/61	1/25/61	2/13/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	3:45 pm	12:00 pm	11:25 am	4:15 pm	4:45 pm
Temperature of stream: °F	37	39	32	51	60
Discharge (cfs)	1,190	996	605	1,200	860
Spec. cond. micromhos @ 25° C (field)	2,050	--	1,600	1,750	2,100
Spec. cond. micromhos @ 25° C (lab.)	1,990	2,050	2,380	1,700	2,070
pH	7.2	7.8	7.45	7.4	7.6
Turbidity, Jackson units	--	--	--	>25	--
Dissolved solids*	1,147	1,260	1,445	1,016	1,201
Boron (B)	.12	.27	.155	.10	.12
Calcium (Ca)	108	111	140	104	108
Magnesium (Mg)	24	32	31	78	31
Total Hardness ($CaCO_3$)	370	410	480	580	400
Sodium (Na)	245	282	310	220	290
Potassium (K)	5	--	5.5	5.0	5.5
Chloride (Cl)	395	420	515	345	410
Sulfate(SO_4)	170	198	225	175	208
Alkalinity ($CaCO_3$)	200	218	256	208	204
Nitrate (N)	--	1.7	--	--	--
Silica(SiO_2)	12.3	11	11.4	10.0	9.1
Fluoride (F)	.65	.5	.76	.64	.71

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	227
Location:	Arkansas River at Arkansas City, Kansas
Basin:	Arkansas River
Tributary to:	

Date collected:	7/26/60	8/18/60	9/19/60	10/17/60	11/16/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	1:45 pm	12:30 pm	4:35 pm	4:15 pm	8:00 am
Temperature of stream: °F	90	82	83	64	57
Discharge (cfs)	1,310	909	833	2,230	1,020
Spec. cond. micromhos @ 25° C (field)	1,490	2,000	1,900	810	1,750
Spec. cond. micromhos @ 25° C (lab.)	1,200	1,800	1,800	850	1,800
pH	7.6	8.2	7.9	7.4	7.5
Turbidity, Jackson units	105	67	<25	5,000	<25
Dissolved solids*	840	1,090	1,120	510	1,060
Boron (B)	0.11	0.18	0.18	0.14	0.13
Calcium (Ca)	76	100	96	58	108
Magnesium (Mg)	30	53	27	14	24
Total Hardness ($CaCO_3$)	300	470	350	200	370
Sodium (Na)	188	290	235	78	240
Potassium (K)	6.9	6.5	6.6	5.8	5.5
Chloride (Cl)	265	400	440	145	370
Sulfate(SO_4)	150	195	170	80	160
Alkalinity ($CaCO_3$)	144	172	152	128	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	10.6	11.9	9.2	10.5	13.0
Fluoride (F)	0.6	0.6	0.6	0.4	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 227
Location: Arkansas River at Arkansas City, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	4/12/61	4/19/61	5/17/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	11:40 am	4:00 pm	10:10 am		
Temperature of stream: °F	44	73	66		
Discharge (cfs)	3,490	1,140	1,380		
Spec. cond. micromhos @ 25° C (field)	--	1,880	1,750		
Spec. cond. micromhos @ 25° C (lab.)	938	1,862	1,830		
pH	8.4	7.6	7.15		
Turbidity, Jackson units	--	> 25	86		
Dissolved solids*	540	1,115	1,045		
Boron (B)	.30	.27	.15		
Calcium (Ca)	58	108	108		
Magnesium (Mg)	16	39	29		
Total Hardness ($CaCO_3$)	210	430	390		
Sodium (Na)	116	215	220		
Potassium (K)	--	5.5	6.5		
Chloride (Cl)	162	355	340		
Sulfate(SO_4)	83	165	150		
Alkalinity ($CaCO_3$)	141	212	220		
Nitrate (N)	1.1	--	--		
Silica(SiO_2)	9.4	6.9	11.4		
Fluoride (F)	.5	.55	.55		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 223
Location: Arkansas River at Wichita, Kansas
Basin: Arkansas River
Tributary to: --

Date collected:	10/27/59	12/8/59	12/23/59	1/27/60	2/17/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	4:25 pm	3:45 pm	8:00 am	3:12 pm	--
Temperature of stream: °F	53	43	38	33	--
Discharge (cfs)	758	569	567	832	1,050
Spec. cond. micromhos @ 25° C (field)	--	2,800	2,150	1,800	--
Spec. cond. micromhos @ 25° C (lab.)	1,920	2,250	2,200	1,900	1,710
pH	7.8	7.7	7.4	7.6	8.2
Turbidity, Jackson units	--	110	< 25	55	--
Dissolved solids*	1,220	1,620	1,650	1,270	1,070
Boron (B)	0.24	0.15	0.18	0.13	0.06
Calcium (Ca)	121	165	156	116	125
Magnesium (Mg)	46	58	46	36	19
Total Hardness ($CaCO_3$)	490	650	580	440	390
Sodium (Na)	236	280	310	250	(Na+K) 224
Potassium (K)	--	7.0	7.3	6.7	--
Chloride (Cl)	262	325	360	350	275
Sulfate(SO_4)	418	520	575	320	298
Alkalinity ($CaCO_3$)	194	230	220	190	172
Nitrate (N)	0.9	1.2	--	--	1.6
Silica(SiO_2)	14.0	16.0	14.2	16.4	7.5
Fluoride (F)	0.5	0.6	0.7	0.36	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 223
Location: Arkansas River at Wichita, Kansas
Basin: Arkansas River
Tributary to: --

Date collected:	2/24/60	3/29/60	4/4/60	5/25/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	2:05 pm	8:05 am	3:40 pm	9:15 am	1:05 pm
Temperature of stream: °F	32	58	55	71	82
Discharge (cfs)	709	8,820	2,610	923	1,040
Spec. cond. micromhos @ 25° C (field)	2,500	325	1,190	1,700	1,700
Spec. cond. micromhos @ 25° C (lab.)	2,100	340	1,350	1,700	1,350
pH	8.0	7.7	7.6	7.9	7.5
Turbidity, Jackson units	< 25	800	--	253	140
Dissolved solids*	1,430	240	895	1,070	880
Boron (B)	0.08	0.09	0.08	0.05	0.02
Calcium (Ca)	145	34	124	116	108
Magnesium (Mg)	36	6	15	24	27
Total Hardness ($CaCO_3$)	510	108	370	390	380
Sodium (Na)	300	29	164	237	135
Potassium (K)	7.0	5.9	8.0	8.4	8.1
Chloride (Cl)	375	32	155	290	205
Sulfate(SO_4)	275	70	350	200	125
Alkalinity ($CaCO_3$)	200	70	170	210	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	15.6	12.6	17.0	13.6	15.0
Fluoride (F)	0.7	0.9	0.28	0.58	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	223
Location:	Arkansas River at Wichita, Kansas
Basin:	Arkansas River
Tributary to:	--

Date collected:	7/25/60	8/18/60	9/20/60	10/18/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:40 am	10:30 am	7:25 am	9:00 am	3:10 pm
Temperature of stream: °F	78	76	72	60	59
Discharge (cfs)	--	764	312	631	393
Spec. cond. micromhos @ 25° C (field)	1,950	1,025	1,300	230	1,400
Spec. cond. micromhos @ 25° C (lab.)	1,700	900	1,175	246	1,440
pH	7.6	7.9	8.1	7.7	7.7
Turbidity, Jackson units	98	< 25	80	5,000	< 25
Dissolved solids*	1,115	540	765	160	850
Boron (B)	0.30	0.15	0.15	0.09	0.12
Calcium (Ca)	56	80	96	22	108
Magnesium (Mg)	51	27	19	6	17
Total Hardness ($CaCO_3$)	350	310	320	80	340
Sodium (Na)	288	105	140	15	180
Potassium (K)	7.5	5.0	5.8	5.0	5.8
Chloride (Cl)	395	100	235	28	265
Sulfate(SO_4)	175	85	123	23	130
Alkalinity ($CaCO_3$)	88	184	156	52	216
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	16.0	12.3	13.4	8.5	14.2
Fluoride (F)	0.3	0.4	0.5	0.4	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 223
Location: Arkansas River at Wichita, Kansas
Basin: Arkansas River
Tributary to: --

Date collected:	12/28/60	1/11/61	1/24/61		
Laboratory:	RATSEC	USGS	RATSEC		
Time of collection:	1:35 pm	9:55 am	4:45 pm		
Temperature of stream: °F	38	36	33		
Discharge (cfs)	442	414	302		
Spec. cond. micromhos @ 25° C (field)	1,790	--	2,200		
Spec. cond. micromhos @ 25° C (lab.)	1,715	2,180	2,000		
pH	7.3	7.9	7.25		
Turbidity, Jackson units	--	--	--		
Dissolved solids*	1,006	1,340	1,195		
Boron (B)	0.12	0.48	0.105		
Calcium (Ca)	108	120	116		
Magnesium (Mg)	24	37	36		
Total Hardness ($CaCO_3$)	370	450	440		
Sodium (Na)	200	298	263		
Potassium (K)	5.0	--	4.9		
Chloride (Cl)	320	450	410		
Sulfate(SO_4)	160	226	195		
Alkalinity ($CaCO_3$)	220	223	232		
Nitrate (N)	--	0.7	--		
Silica(SiO_2)	13.2	11.0	7.2		
Fluoride (F)	0.54	0.6	0.70		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 760
Location: Arkansas River near Haven, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	** 10/27/59	12/8/59	12/22/59	1/27/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	2:40 pm	3:30 pm	2:10 pm	4:55 pm
Temperature of stream: °F	--	42	43	35	--
Discharge (cfs)	662	494	452	560	878
Spec. cond. micromhos @ 25° C (field)	--	3,000	2,900	2,200	--
Spec. cond. micromhos @ 25° C (lab.)	2,270	2,700	2,800	2,600	2,540
pH	7.5	7.9	7.5	7.6	7.9
Turbidity, Jackson units	--	90	< 25	75	--
Dissolved solids*	1,520	2,080	2,150	1,750	1,710
Boron (B)	0.3	0.30	0.27	0.13	.14
Calcium (Ca)	164	185	196	140	160
Magnesium (Mg)	39	65	72	51	46
Total Hardness ($CaCO_3$)	570	720	740	560	590
Sodium (Na)	300	410	420	350	(Na+K) 378
Potassium (K)	--	8	8.1	7.1	--
Chloride (Cl)	295	375	400	390	390
Sulfate(SO_4)	575	640	925	700	565
Alkalinity ($CaCO_3$)	204	220	210	200	221
Nitrate (N)	0.79	--	--	--	.0
Silica(SiO_2)	17	16.8	14.4	16.8	10.
Fluoride (F)	0.5	1.2	1.0	0.34	.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

**Analytical results expressed as parts per million except as noted (applies to column one only).

CHEMICAL ANALYSES

PHS Station No.: 760
Location: Arkansas River near Haven, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	2/24/60	3/28/60	4/4/60	5/25/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	1:00 pm	5:05 pm	2:40 pm	11:00 am	11:25 am
Temperature of stream: °F	32	61	56	70	82
Discharge (cfs)	345	8,040	1,900	822	822
Spec. cond. micromhos @ 25° C (field)	3,500	650	1,650	1,900	2,080
Spec. cond. micromhos @ 25° C (lab.)	3,100	730	1,950	1,900	2,200
pH	7.9	7.6	7.5	7.8	7.8
Turbidity, Jackson units	35	900	--	121	260
Dissolved solids*	2,140	480	1,340	1,230	1,550
Boron (B)	.14	0.06	0.10	.06	0.2
Calcium (Ca)	170	80	168	124	144
Magnesium (Mg)	58	15	24	27	44
Total Hardness ($CaCO_3$)	670	260	520	420	540
Sodium (Na)	525	75	150	267	270
Potassium (K)	8.2	8.7	9.1	7.3	8.7
Chloride (Cl)	555	55	190	320	310
Sulfate(SO_4)	625	170	575	300	425
Alkalinity ($CaCO_3$)	240	130	200	210	200
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	16.4	14.0	16.2	13.6	16.9
Fluoride (F)	0.6	0.9	0.36	.45	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 760
Location: Arkansas River near Haven, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	7/27/60	8/18/60	9/20/60	10/18/60	11/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:40 am	8:45 am	8:40 am	10:20 am	2:00 pm
Temperature of stream: °F	82	67	66	60	57
Discharge (cfs)	392	225	153	194	260
Spec. cond. micromhos @ 25° C (field)	2,100	2,600	2,720	2,600	2,300
Spec. cond. micromhos @ 25° C (lab.)	1,850	2,400	2,400	2,810	2,400
pH	7.6	8.0	8.0	7.6	7.8
Turbidity, Jackson units	128	< 25	< 25	40	< 25
Dissolved solids*	1,240	1,450	1,635	1,635	1,455
Boron (B)	0.23	0.18	0.21	0.18	0.18
Calcium (Ca)	96	108	112	108	112
Magnesium (Mg)	49	36	36	29	41
Total Hardness ($CaCO_3$)	440	420	430	390	450
Sodium (Na)	300	420	370	410	360
Potassium (K)	7.5	6.2	7.5	6.8	6.2
Chloride (Cl)	385	530	605	660	520
Sulfate(SO_4)	325	325	275	213	275
Alkalinity ($CaCO_3$)	160	172	232	184	224
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	15.0	12.8	13.2	11.4	13.2
Fluoride (F)	0.5	0.8	0.8	0.8	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 760
Location: Arkansas River near Haven, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	12/28/60	1/10/61	1/24/61	2/14/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	11:50 am	3:45 pm	3:30 pm	9:00 am	2:00 pm
Temperature of stream: °F	34	42	32	41	60
Discharge (cfs)	305	296	190	345	291
Spec. cord. micromhos @ 25° C (field)	2,850	--	3,000	2,650	2,600
Spec. cond. micromhos @ 25° C (lab.)	3,283	2,730	3,170	2,500	2,530
pH	6.9	7.8	7.1	7.4	7.55
Turbidity, Jackson units	--	--	--	56	--
Dissolved solids*	1,712	1,740	1,916	43	1,524
Boron (B)	.15	.42	.14	.15	.09
Calcium (Ca)	128	124	152	128	120
Magnesium (Mg)	39	39	31	36	36
Total Hardness ($CaCO_3$)	480	470	510	470	450
Sodium (Na)	435	441	469	365	340
Potassium (K)	6.2	--	6.2	6.3	5.8
Chloride (Cl)	610	600	720	540	500
Sulfate(SO_4)	325	351	365	375	338
Alkalinity ($CaCO_3$)	228	212	244	212	204
Nitrate (N)	--	1.0	--	--	--
Silica(SiO_2)	12.8	9.0	11.6	10.4	16.2
Fluoride (F)	.70	.8	.76	.59	.92

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 760
Location: Arkansas River near Haven, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	4/12/61	4/19/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	8:10 am	11:55 am	5:30 pm		
Temperature of stream: °F	38	68	65		
Discharge (cfs)	635	362	605		
Spec. cond. micromhos @ 25° C (field)	--	3,000	2,200		
Spec. cond. micromhos @ 25° C (lab.)	2,430	2,928	2,270		
pH	8.3	7.5	7.25		
Turbidity, Jackson units	--	47	120		
Dissolved solids*	1,470	1,795	1,310		
Boron (B)	.27	.3	.29		
Calcium (Ca)	112	128	116		
Magnesium (Mg)	32	34	29		
Total Hardness ($CaCO_3$)	410	460	410		
Sodium (Na)	372	375	300		
Potassium (K)	--	6.5	7.9		
Chloride (Cl)	540	570	430		
Sulfate(SO_4)	246	300	238		
Alkalinity ($CaCO_3$)	197	224	216		
Nitrate (N)	.7	--	--		
Silica(SiO_2)	11.	6.9	13.8		
Fluoride (F)	.5	.50	.92		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 767
Location: Rattlesnake Creek near Raymond, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/16/60	3/9/60	3/28/60	6/29/60	7/27/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	--	--	4:00 pm	9:55 am	2:15 pm
Temperature of stream: °F	43	34	62	78	90
Discharge (cfs)	--	--	--	65	38
Spec. cond. micromhos @ 25° C (field)	--	--	1,850	3,900	3,500
Spec. cond. micromhos @ 25° C (lab.)	3,660	3,510	1,950	3,600	3,000
pH	8.1	7.9	8.1	7.6	7.8
Turbidity, Jackson units	--	--	550	350	240
Dissolved solids*	2,210	1,960	1,200	2,115	2,000
Boron (B)	0.09	0.11	0.11	0.2	0.11
Calcium (Ca)	96	96	76	108	88
Magnesium (Mg)	20	22	19	17	19
Total Hardness ($CaCO_3$)	320	330	270	340	300
Sodium (Na)	687	612	365	645	620
Potassium (K)	--	--	8.5	6.2	6.2
Chloride (Cl)	1,050	935	500	1,080	980
Sulfate(SO_4)	122	12[illegible]	58	120	118
Alkalinity ($CaCO_3$)	200	208	200	184	176
Nitrate (N)	1.0	1.0	--	--	--
Silica(SiO_2)	10.0	20.0	15.5	16.3	16.4
Fluoride (F)	0.7	0.5	0.8	--	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	767
Location:	Rattlesnake Creek near Raymond, Kansas
Basin:	Arkansas River
Tributary to:	Arkansas River

Date collected:	8/17/60	9/20/60	10/18/60	11/15/60	12/27/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	7:45 pm	10:30 am	1:00 pm	12:40 pm	10:40 am
Temperature of stream: °F	71	71	63	52	32
Discharge (cfs)	30	5.7	22	45	--
Spec. cond. micromhos @ 25° C (field)	3,500	5,700	4,700	2,800	5,000
Spec. cond. micromhos @ 25° C (lab.)	3,300	5,300	4,650	3,500	4,557
pH	7.9	7.9	7.4	7.4	7.4
Turbidity, Jackson units	360	< 25	12	< 25	--
Dissolved solids*	1,940	3,120	2,570	1,985	2,622
Boron (B)	0.25	0.27	0.24	0.12	0.14
Calcium (Ca)	92	72	84	84	100
Magnesium (Mg)	22	41	27	22	29
Total Hardness ($CaCO_3$)	320	340	320	300	370
Sodium (Na)	600	920	725	645	813
Potassium (K)	7.9	2.8	6.2	6.2	6.0
Chloride (Cl)	960	1,650	1,325	980	1,280
Sulfate(SO_4)	130	200	135	138	180
Alkalinity ($CaCO_3$)	184	100	164	104	192
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	15.9	10.8	13.2	12.8	13.1
Fluoride (F)	0.7	0.8	0.8	0.5	0.70

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 767
Location: Rattlesnake Creek near Raymond, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	1/10/61	1/24/61	2/14/61	3/14/61	4/11/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	2:15 pm	2:00 pm	12:05 pm	12:50 pm	6:10 pm
Temperature of stream: °F	40	32	42	54	45
Discharge (cfs)	61	35	94	65	88
Spec. cond. micromhos @ 25° C (field)	--	4,500	5,500	4,200	--
Spec. cond. micromhos @ 25° C (lab.)	4,450	4,210	4,500	4,000	4,480
pH	7.7	7.7	7.3	7.7	7.8
Turbidity, Jackson units	--	--	47	350	--
Dissolved solids*	2,620	2,521	2,975	2,260	2,580
Boron (B)	0.30	0.145	0.14	0.06	0.37
Calcium (Ca)	95	100	96	92	93
Magnesium (Mg)	30	34	29	27	31
Total Hardness ($CaCO_3$)	360	390	360	340	360
Sodium (Na)	816	962	913	675	829
Potassium (K)	--	5.8	6.0	17.5	--
Chloride (Cl)	1,250	1,150	1,500	1,125	1,280
Sulfate(SO_4)	171	158	195	130	161
Alkalinity ($CaCO_3$)	192	192	172	204	187
Nitrate (N)	0.2	--	--	--	0.4
Silica(SiO_2)	9.0	7.7	8.8	11.7	15.0
Fluoride (F)	0.5	0.09	0.59	0.81	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 767
Location: Rattlesnake Creek near Raymond, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	4/19/61	5/16/61			
Laboratory:	RATSEC	RATSEC			
Time of collection:	10:30 am	4:00 pm			
Temperature of stream: °F	63	62			
Discharge (cfs)	82	--			
Spec. cond. micromhos @ 25° C (field)	4,760	4,800			
Spec. cond. micromhos @ 25° C (lab.)	60,000	4,500			
pH	7.2	7.25			
Turbidity, Jackson units	250	230			
Dissolved solids*	45,926	2,540			
Boron (B)	2.4	0.15			
Calcium (Ca)	1,440	104			
Magnesium (Mg)	291	24			
Total Hardness ($CaCO_3$)	440	360			
Sodium (Na)	12,250	820			
Potassium (K)	41.8	6.9			
Chloride (Cl)	34,500	1,300			
Sulfate(SO_4)	4,400	155			
Alkalinity ($CaCO_3$)	108	216			
Nitrate (N)	--	--			
Silica(SiO_2)	--	13.2			
Fluoride (F)	--	0.82			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 220
Location: Arkansas River at Great Bend, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	10/27/59	12/8/59	12/22/59	1/27/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	12:30 pm	12:05 pm	1:25 pm	12:00 n	2:20 pm
Temperature of stream: °F	51	40	66	33	--
Discharge (cfs)	256	292	280	340	360
Spec. cond. micromhos @ 25° C (field)	--	3,100	2,600	1,950	--
Spec. cond. micromhos @ 25° C (lab.)	2,770	2,700	2,600	2,300	2,740
pH	7.7	8.0	7.4	7.6	8.1
Turbidity, Jackson units	--	150	$<$ 25	36	--
Dissolved solids*	2,240	2,580	2,450	1,880	2,280
Boron (B)	0.43	0.44	0.29	0.11	.36
Calcium (Ca)	236	270	242	196	248
Magnesium (Mg)	110	95	108	173	98
Total Hardness ($CaCO_3$)	1,040	1,070	1,050	1,200	1,020
Sodium (Na)	320	300	310	185	(Na+K) 328
Potassium (K)	--	9	3.5	8.2	--
Chloride (Cl)	105	100	105	70	105
Sulfate(SO_4)	1,330	1,400	1,550	1,080	1,310
Alkalinity ($CaCO_3$)	197	210	220	210	213
Nitrate (N)	1.4	1.5	--	--	1.9
Silica(SiO_2)	14	17.6	16.1	17.8	13
Fluoride (F)	0.9	0.4	1.0	0.56	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 220
Location: Arkansas River at Great Bend, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	2/24/60	3/28/60	4/4/60	5/25/60	6/29/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:15 am	2:25 pm	12:00 N	2:30 pm	8:40 am
Temperature of stream: °F	32	75	52	75	77
Discharge (cfs)	180	1,000	1,080	280	264
Spec. cond. micromhos @ 25° C (field)	2,900	1,800	1,400	1,500	2,200
Spec. cond. micromhos @ 25° C (lab.)	1,150	1,900	1,600	1,500	2,050
pH	8.1	7.8	7.7	7.7	7.7
Turbidity, Jackson units	25	410	--	< 25	470
Dissolved solids*	750	1,640	1,240	1,175	1,775
Boron (B)	.08	0.18	0.18	.07	0.2
Calcium (Ca)	76	188	176	132	188
Magnesium (Mg)	15	72	36	46	75
Total Hardness ($CaCO_3$)	250	770	590	520	780
Sodium (Na)	140	232	160	145	210
Potassium (K)	3.7	10.0	10.4	8.5	9.4
Chloride (Cl)	210	90	50	45	80
Sulfate(SO_4)	125	575	725	500	675
Alkalinity ($CaCO_3$)	120	180	200	180	200
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.2	15.7	17.6	12.8	15.1
Fluoride (F)	0.6	0.8	0.30	.75	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 220
Location: Arkansas River at Great Bend, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	7/27/60	8/17/60	9/20/60	10/18/60	11/15/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	4:00 pm	3:30 pm	12:00 N	11:50 pm	12:40 pm
Temperature of stream: °F	90	71	84	60	51
Discharge (cfs)	112	20	5	90	99
Spec. cond. micromhos @ 25° C (field)	1,550	1,410	1,310	1,225	1,300
Spec. cond. micromhos @ 25° C (lab.)	1,490	1,210	1,210	1,280	1,430
pH	7.3	7.9	7.6	7.1	7.9
Turbidity, Jackson units	--	< 25	< 25	25	< 25
Dissolved solids*	1,140	915	910	965	1,060
Boron (B)	.28	0.25	0.21	0.17	0.21
Calcium (Ca)	109	120	112	116	132
Magnesium (Mg)	53	46	34	39	46
Total Hardness ($CaCO_3$)	490	490	420	450	520
Sodium (Na)	164	120	115	108	125
Potassium (K)	--	6.2	7.5	6.5	6.5
Chloride (Cl)	70	62	82	66	64
Sulfate(SO_4)	601	475	400	475	230
Alkalinity ($CaCO_3$)	120	168	168	172	216
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12	13.2	12.8	10.0	13.6
Fluoride (F)	.9	0.9	0.8	1.0	0.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 220
Location: Arkansas River at Great Bend, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	12/28/60	1/10/61	1/24/61	2/14/61	3/14/61
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	9:30 am	1:00 pm	11:40 am	1:35 pm	11:20 am
Temperature of stream: °F	32	40	32	47	52
Discharge (cfs)	150	116	70	136	119
Spec. cond. micromhos @ 25° C (field)	1,600	--	1,550	1,860	1,610
Spec. cond. micromhos @ 25° C (lab.)	1,560	1,580	1,660	1,750	1,600
pH	7.4	7.8	7.3	7.5	7.7
Turbidity, Jackson units	--	--	--	> 25	< 25
Dissolved solids*	1,151	1,220	1,250	--	1,161
Boron (B)	.18	.31	.14	.3	.05
Calcium (Ca)	148	151	160	168	144
Magnesium (Mg)	49	52	53	61	51
Total Hardness ($CaCO_3$)	570	590	620	670	570
Sodium (Na)	128	156	159	180	125
Potassium (K)	6.5	--	6.8	8.2	6.5
Chloride (Cl)	62	65	76	--	80
Sulfate(SO_4)	565	596	588	750	600
Alkalinity ($CaCO_3$)	204	210	220	204	204
Nitrate (N)	--	1.5	--	--	--
Silica(SiO_2)	13.8	15	13.8	11.0	9.7
Fluoride (F)	.76	.9	.98	.75	.97

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 220
Location: Arkansas River at Great Bend, Kansas
Basin: Arkansas River
Tributary to:

Date collected:	4/11/61	4/19/61	5/16/61		
Laboratory:	USGS	RATSEC	RATSEC		
Time of collection:	4:50 pm	9:05 am	3:00 pm		
Temperature of stream: °F	45	60	64		
Discharge (cfs)	127	105	144		
Spec. cond. micromhos @ 25° C (field)	--	1,470	1,350		
Spec. cond. micromhos @ 25° C (lab.)	1,370	1,354	1,400		
pH	8.1	7.7	7.00		
Turbidity, Jackson units	--	> 25	> 25		
Dissolved solids*	1,030	1,037	958		
Boron (B)	.37	.29	.14		
Calcium (Ca)	136	140	136		
Magnesium (Mg)	44	46	41		
Total Hardness ($CaCO_3$)	520	540	510		
Sodium (Na)	129	115	115		
Potassium (K)	--	6.0	6.9		
Chloride (Cl)	58	60	58		
Sulfate(SO_4)	485	475	400		
Alkalinity ($CaCO_3$)	207	212	212		
Nitrate (N)	1.2	--	--		
Silica(SiO_2)	9.6	6.0	11.9		
Fluoride (F)	.8	.55	1.02		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: --
Location: Rattlesnake Creek about 2 miles West of Hopewell, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	3/9/60				
Laboratory:	RATSEC				
Time of collection:	--				
Temperature of stream: °F	43				
Discharge (cfs)	--				
Spec. cond. micromhos @ 25° C (field)	--				
Spec. cond. micromhos @ 25° C (lab.)	333				
pH	8.1				
Turbidity, Jackson units	--				
Dissolved solids*	206				
Boron (B)	0.12				
Calcium (Ca)	53				
Magnesium (Mg)	4.9				
Total Hardness ($CaCO_3$)	152				
Sodium (Na)	12				
Potassium (K)	--				
Chloride (Cl)	7.0				
Sulfate(SO_4)	12				
Alkalinity ($CaCO_3$)	143				
Nitrate (N)	3.4				
Silica(SiO_2)	10				
Fluoride (F)	0.8				

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: --
Location: Rattlesnake Creek 3 miles East and 1 mile South of Hudson, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	3/9/60				
Laboratory:	RATSEC				
Time of collection:	--				
Temperature of stream: °F	33				
Discharge (cfs)	--				
Spec. cond. micromhos @ 25° C (field)	--				
Spec. cond. micromhos @ 25° C (lab.)	1,780				
pH	7.5				
Turbidity, Jackson units	--				
Dissolved solids*	978				
Boron (B)	0.14				
Calcium (Ca)	75				
Magnesium (Mg)	14				
Total Hardness ($CaCO_3$)	245				
Sodium (Na)	278				
Potassium (K)	--				
Chloride (Cl)	425				
Sulfate(SO_4)	59				
Alkalinity ($CaCO_3$)	182				
Nitrate (N)	1.2				
Silica(SiO_2)	18				
Fluoride (F)	0.7				

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 766
Location: Rattlesnake Creek 7 miles South of Dillwyn, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	** 10/27/59	12/8/59	12/22/59	1/27/60	2/16/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	11:20 am	12:10 pm	11:15 am	11:30 am
Temperature of stream: °F	--	42	43	38	--
Discharge (cfs)	39	38	37	39	44
Spec. cond. micromhos @ 25° C (field)	--	460	390	390	--
Spec. cond. micromhos @ 25° C (lab.)	421	370	400	440	426
pH	7.4	8.1	7.9	7.9	8.1
Turbidity, Jackson units	--	< 25	< 25	< 25	--
Dissolved solids*	256	260	270	275	260
Boron (B)	0.09	0.11	0.12	0.02	0.03
Calcium (Ca)	62	60	60	58	61
Magnesium (Mg)	4.3	5	7	9	6.8
Total Hardness ($CaCO_3$)	172	175	180	180	180
Sodium (Na)	(Na+K) 23	50	23	22	(Na+K) 22
Potassium (K)	--	2.0	3.6	2.9	--
Chloride (Cl)	16	10	25	12	14
Sulfate(SO_4)	18	12	18	24	21
Alkalinity ($CaCO_3$)	172	160	160	120	180
Nitrate (N)	2.0	1.6	--	--	1.4
Silica(SiO_2)	20.0	18.8	12.4	17.0	18.0
Fluoride (F)	0.3	0.3	0.6	0.36	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

** Analytical results expressed as parts per million except as noted. Applies to column one only.

CHEMICAL ANALYSES

PHS Station No.: 766
Location: Rattlesnake Creek 7 miles South of Dillwyn, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	2/24/60	3/9/60	4/4/60		
Laboratory:	RATSEC	USGS	RATSEC		
Time of collection:	9:15 am	--	11:10 am		
Temperature of stream: °F	32	44	54		
Discharge (cfs)	39	41	54		
Spec. cond. micromhos @ 25° C (field)	480	--	390		
Spec. cond. micromhos @ 25° C (lab.)	450	408	420		
pH	8.1	8.1	7.9		
Turbidity, Jackson units	25	--	--		
Dissolved solids*	320	260	266		
Boron (B)	0.06	0.2	0.03		
Calcium (Ca)	68	62	62		
Magnesium (Mg)	5.0	4.3	8.0		
Total Hardness ($CaCO_3$)	190	172	188		
Sodium (Na)	28	23	21		
Potassium (K)	3.0	--	3.8		
Chloride (Cl)	12	12	12		
Sulfate(SO_4)	30	21	25		
Alkalinity ($CaCO_3$)	170	172	190		
Nitrate (N)	--	2.5	--		
Silica(SiO_2)	18.0	24.0	18.6		
Fluoride (F)	0.6	0.6	0.40		

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: --
Location: Rattlesnake Creek 10 miles Northeast of Hudson, Kansas
Basin: Arkansas River
Tributary to: Arkansas River

Date collected:	3/9/60				
Laboratory:	RATSEC				
Time of collection:	--				
Temperature of stream: °F	33				
Discharge (cfs)	--				
Spec. cond. micromhos @ 25° C (field)	--				
Spec. cond. micromhos @ 25° C (lab.)	2,930				
pH	8.1				
Turbidity, Jackson units	--				
Dissolved solids*	1,280				
Boron (B)	0.10				
Calcium (Ca)	90				
Magnesium (Mg)	8.6				
Total Hardness ($CaCO_3$)	260				
Sodium (Na)	386				
Potassium (K)	--				
Chloride (Cl)	585				
Sulfate(SO_4)	72				
Alkalinity ($CaCO_3$)	195				
Nitrate (N)	0.8				
Silica(SiO_2)	13				
Fluoride (F)	0.6				

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 529
Location: Red River at Index, Arkansas
Basin: Red River
Tributary to: --

Date collected:	11/4/59	12/9/59	12/29/59	2/16/60	2/23/60
Laboratory:	USGS	BATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	8:25 am	4:45 pm
Temperature of stream: °F	66	--	--	40	--
Discharge (cfs)	3,900	2,680	19,100	13,800	10,900
Spec. cond. micromhos @ 25° C (field)	--	--	--	1,200	--
Spec. cond. micromhos @ 25° C (lab.)	1,420	1,150	1,100	1,200	820
pH	7.7	7.6	8.0	7.6	7.8
Turbidity, Jackson units	--	< 25	200	100	--
Dissolved solids*	829	755	734	730	489
Boron (B)	0.16	0.12	0.12	0.09	.20
Calcium (Ca)	93	100	82	80	60
Magnesium (Mg)	24	18	18	19	16
Total Hardness ($CaCO_3$)	330	320	280	280	215
Sodium (Na)	174	140	110	155	(Na+K) 86
Potassium (K)	--	4	5.9	4.4	--
Chloride (Cl)	272	185	220	200	140
Sulfate(SO_4)	181	140	185	180	106
Alkalinity ($CaCO_3$)	135	215	90	100	94
Nitrate (N)	0.09	< 0.1	--	--	.2
Silica(SiO_2)	3.0	9.6	8.0	8.0	7.5
Fluoride (F)	0.2	0.2	0.4	0.14	.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 529
Location: Red River at Index, Arkansas
Basin: Red River
Tributary to: --

Date collected:	3/2/60	3/22/60	4/26/60	5/17/60	5/24/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	9:20 am	11:45 am	1:30 pm	9:10 am	8:55 am
Temperature of stream: °F	37	68	70	73	--
Discharge (cfs)	11,600	7,660	5,600	5,010	52,100
Spec. cond. micromhos @ 25° C (field)	860	700	1,100	500	--
Spec. cond. micromhos @ 25° C (lab.)	800	730	1,060	500	253
pH	8.1	7.9	7.8	7.9	7.3
Turbidity, Jackson units	100	54	34	--	--
Dissolved solids*	530	460	714	361	175
Boron (B)	.08	0.09	.04	0.08	.26
Calcium (Ca)	60	64	77	51	21
Magnesium (Mg)	31	10	21	5	9.1
Total Hardness ($CaCO_3$)	280	200	280	148	90
Sodium (Na)	90	82	120	47	15
Potassium (K)	3.5	3.5	3.4	4.8	--
Chloride (Cl)	140	85	175	65	24
Sulfate(SO_4)	135	80	138	70	20
Alkalinity ($CaCO_3$)	90	120	150	110	67
Nitrate (N)	--	--	--	--	.2
Silica(SiO_2)	7.4	8.0	7.5	9.6	5.8
Fluoride (F)	0.4	0.9	.22	0.20	.1

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	529
Location:	Red River at Index, Arkansas
Basin:	Red River
Tributary to:	--

Date collected:	6/15/60	6/21/60	7/13/60	7/20/60	8/17/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	9:45 am	9:45 am	12:30 pm	12:30 pm	12:20 pm
Temperature of stream: °F	79	83	76	86	86
Discharge (cfs)	5,800	4,200	7,140	5,600	2,300
Spec. cond. micromhos @ 25° C (field)	840	1,080	--	1,500	1,600
Spec. cond. micromhos @ 25° C (lab.)	800	1,050	1,500	1,370	1,500
pH	8.2	7.9	7.7	8.0	8.4
Turbidity, Jackson units	41	< 25	--	< 25	< 25
Dissolved solids*	621	715	975	950	945
Boron (B)	0.05	.05	.17	0.15	0.15
Calcium (Ca)	74	90	94	91	112
Magnesium (Mg)	17	17	26	32	34
Total Hardness ($CaCO_3$)	250	292	340	360	420
Sodium (Na)	50	105	183	195	190
Potassium (K)	3.5	4.4	--	4.5	4.7
Chloride (Cl)	120	175	282	294	305
Sulfate(SO_4)	90	125	217	200	230
Alkalinity ($CaCO_3$)	156	144	113	116	144
Nitrate (N)	--	--	0	--	--
Silica(SiO_2)	9.2	7.8	8.0	7.1	7.5
Fluoride (F)	0.30	1.0	.3	0.4	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 529
Location: Red River at Index, Arkansas
Basin: Red River
Tributary to: --

Date collected:	9/12/60	10/12/60	10/19/60	11/15/60	12/13/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	4:00 pm	11:30 am	11:45 am	5:00 pm	5:30 pm
Temperature of stream: °F	81	--	71	63	70
Discharge (cfs)	3,530	5,800	4,050	5,600	68,000
Spec. cond. micromhos @ 25° C (field)	1,700	775	1,800	1,750	322
Spec. cond. micromhos @ 25° C (lab.)	1,450	760	1,740	1,770	407
pH	7.9	7.3	7.4	7.7	7.1
Turbidity, Jackson units	27	--	71	54	--
Dissolved solids*	965	509	1,065	1,020	218
Boron (B)	0.19	.40	0.18	0.20	.07
Calcium (Ca)	104	51	108	104	45
Magnesium (Mg)	29	14	29	32	7
Total Hardness ($CaCO_3$)	380	184	390	390	140
Sodium (Na)	170	87	196	198	23
Potassium (K)	4.5	--	5.5	5.0	2.5
Chloride (Cl)	310	130	345	350	50
Sulfate(SO_4)	210	102	235	138	45
Alkalinity ($CaCO_3$)	140	82	124	136	104
Nitrate (N)	--	0	--	--	--
Silica(SiO_2)	8.8	5.0	7.0	7.0	6.4
Fluoride (F)	TR	.3	0.5	0.5	.10

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 529
Location: Red River at Index, Arkansas
Basin: Red River
Tributary to: --

Date collected:	1/17/61	1/24/61	2/14/61	3/14/61	4/11/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:50 pm	11:40 am	4:10 pm	12:45 pm	1:30 pm
Temperature of stream: °F	76	73	77	62	--
Discharge (cfs)	8,180	7,660	9,600	10,600	21,225
Spec. cond. micromhos @ 25° C (field)	--	1,800	690	795	--
Spec. cond. micromhos @ 25° C (lab.)	1,540	1,675	685	870	1,286
pH	7.6	7.3	7.3	7.4	7.8
Turbidity, Jackson units	--	--	173	120	150
Dissolved solids*	971	1,034	384	503	776
Boron (B)	.24	.12	.07	.09	.29
Calcium (Ca)	92	116	58	80	100
Magnesium (Mg)	32	22	11	12	15
Total Hardness ($CaCO_3$)	360	380	190	210	310
Sodium (Na)	187	198	50	75	135
Potassium (K)	--	4.5	3.4	3	3.8
Chloride (Cl)	305	340	100	142	344
Sulfate(SO_4)	219	275	92	116	175
Alkalinity ($CaCO_3$)	107	124	96	92	96
Nitrate (N)	.1	--	--	--	--
Silica(SiO_2)	6.8	7.1	5.2	7.3	7.5
Fluoride (F)	.5	.43	.19	.40	.50

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 529
Location: Red River at Index, Arkansas
Basin: Red River
Tributary to: --

Date collected:	4/18/61	5/23/61			
Laboratory:	USGS	RATSEC			
Time of collection:	12:15 pm	11:45 am			
Temperature of stream: °F	62	75			
Discharge (cfs)	13,000	5,400			
Spec. cond. micromhos @ 25° C (field)	--	1,400			
Spec. cond. micromhos @ 25° C (lab.)	1,460	1,503			
pH	7.9	7.45			
Turbidity, Jackson units	--	46			
Dissolved solids*	877	891			
Boron (B)	.41	.15			
Calcium (Ca)	87	100			
Magnesium (Mg)	25	27			
Total Hardness ($CaCO_3$)	320	360			
Sodium (Na)	184	180			
Potassium (K)	--	4.5			
Chloride (Cl)	285	265			
Sulfate(SO_4)	201	202			
Alkalinity ($CaCO_3$)	108	136			
Nitrate (N)	.1	--			
Silica(SiO_2)	5.8	7.1			
Fluoride (F)	.4	.40			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 527
Location: Red River at Arthur City, Texas
Basin: Red River
Tributary to: --

Date collected:	11/3/59	12/8/59	12/28/59	2/15/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	2:35 pm	2:10 pm
Temperature of stream: °F	70	--	--	42	--
Discharge (cfs)	--	682	15,500	3,540	7,690
Spec. cond. micromhos @ 25° C (field)	--	--	--	1,480	--
Spec. cond. micromhos @ 25° C (lab.)	1,570	1,350	1,240	1,400	1,260
pH	7.7	7.6	7.8	7.7	7.9
Turbidity, Jackson units	--	< 25	80	45	--
Dissolved solids*	922	890	760	930	761
Boron (B)	0.13	0.17	0.20	0.09	.28
Calcium (Ca)	100	105	92	92	85
Magnesium (Mg)	24	25	17	24	25
Total Hardness ($CaCO_3$)	350	370	300	330	315
Sodium (Na)	200	170	64	170	(Na+K) 139
Potassium (K)	--	5	4.7	4.8	--
Chloride (Cl)	310	255	250	230	225
Sulfate (SO_4)	207	180	195	250	170
Alkalinity ($CaCO_3$)	131	95	110	120	121
Nitrate (N)	0.02	< 0.1	--	--	.2
Silica (SiO_2)	1.5	16.4	6.8	6.8	7.5
Fluoride (F)	0.3	0.3	0.3	0.28	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 527
Location: Red River at Arthur City, Texas
Basin: Red River
Tributary to: --

Date collected:	3/1/60	3/22/60	4/26/60	5/17/60	5/24/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	2:25 pm	2:30 pm	5:05 pm	12:50 pm	12:15 pm
Temperature of stream: °F	39	70	73	--	--
Discharge (cfs)	8,930	2,630	1,750	1,250	18,600
Spec. cond. micromhos @ 25° C (field)	1,150	1,100	1,180	1,150	--
Spec. cond. micromhos @ 25° C (lab.)	1,200	1,010	1,200	1,020	162
pH	8.2	7.7	7.8	7.9	7.2
Turbidity, Jackson units	45	< 25	< 25	--	--
Dissolved solids*	730	660	746	780	111
Boron (B)	.15	0.09	.06	0.10	.15
Calcium (Ca)	76	96	88	104	18
Magnesium (Mg)	29	12	24	12	3.2
Total Hardness ($CaCO_3$)	310	290	320	310	58
Sodium (Na)	115	113	125	110	12
Potassium (K)	4.2	4.2	5.0	4.4	--
Chloride (Cl)	220	170	170	150	15
Sulfate(SO_4)	175	125	155	110	12
Alkalinity ($CaCO_3$)	110	150	160	170	48
Nitrate (N)	--	--	--	--	.3
Silica(SiO_2)	6.6	10.0	7.5	8.8	7.5
Fluoride (F)	0.5	0.8	.58	0.22	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 527
Location: Red River at Arthur City, Texas
Basin: Red River
Tributary to: --

Date collected:	6/15/60	6/21/60	7/13/60	7/20/60	8/17/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	1:10 pm	1:15 pm	9:00 am	8:55 am	9:15 am
Temperature of stream: °F	84	84	--	84	81
Discharge (cfs)	3,830	--	2,630	1,480	580
Spec. cond. micromhos @ 25° C (field)	975	1,500	--	1,300	1,400
Spec. cond. micromhos @ 25° C (lab.)	970	1,500	1,540	1,200	1,360
pH	8.2	7.9	7.9	7.7	7.8
Turbidity, Jackson units	425	< 25	--	29	< 25
Dissolved solids*	624	990	902	840	860
Boron (B)	0.03	0.1	.19	0.16	0.21
Calcium (Ca)	96	100	96	84	104
Magnesium (Mg)	12	34	33	29	34
Total Hardness ($CaCO_3$)	290	390	375	330	400
Sodium (Na)	100	160	171	165	160
Potassium (K)	4.2	4.7	--	4.3	5.6
Chloride (Cl)	155	275	275	270	260
Sulfate(SO_4)	145	180	209	168	165
Alkalinity ($CaCO_3$)	136	132	139	128	172
Nitrate (N)	--	--	.1	--	--
Silica(SiO_2)	8.8	7.3	8.0	7.8	9.2
Fluoride (F)	0.08	0.9	.3	0.5	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 527
Location: Red River at Arthur City, Texas
Basin: Red River
Tributary to: --

Date collected:	9/13/60	10/12/60	10/18/60	11/15/60	12/13/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	10:00 am	3:00 pm	4:35 pm	2:30 pm	2:40 pm
Temperature of stream: °F	78	--	69	67	72.5
Discharge (cfs)	970	914	773	3,630	22,700
Spec. cond. micromhos @ 25° C (field)	1,650	1,125	1,300	1,900	800
Spec. cond. micromhos @ 25° C (lab.)	1,700	1,120	1,360	1,970	872
pH	8.0	7.6	7.4	7.8	7.5
Turbidity, Jackson units	> 25	--	40	< 25	--
Dissolved solids*	1,095	677	740	1,165	477
Boron (B)	0.18	.22	0.12	0.18	.12
Calcium (Ca)	112	77	82	108	56
Magnesium (Mg)	34	20	23	61	17
Total Hardness ($CaCO_3$)	420	275	300	1,000	212
Sodium (Na)	215	132	91	740	80
Potassium (K)	2.2	--	4.8	8.1	3.8
Chloride (Cl)	370	192	230	1,325	145
Sulfate(SO_4)	245	147	165	725	107
Alkalinity ($CaCO_3$)	132	138	128	260	84
Nitrate (N)	--	0	--	--	--
Silica(SiO_2)	7.6	8.8	7.0	10.8	6.6
Fluoride (F)	0.4	.3	0.4	0.4	.31

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 527
Location: Red River at Arthur City, Texas
Basin: Red River
Tributary to: --

Date collected:	1/17/61	1/24/61	3/14/61	4/11/61	4/18/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	12:55 pm	9:00 am	10:00 am	9:50 am	9:25 am
Temperature of stream: °F	77	73	58	--	61
Discharge (cfs)	6,200	4,900	1,570	11,400	4,132
Spec. cond. micromhos @ 25° C (field)	--	1,896	1,240	--	--
Spec. cond. micromhos @ 25° C (lab.)	1,800	1,850	1,400	1,920	1,590
pH	7.6	7.55	7.75	7.9	7.8
Turbidity, Jackson units	--	--	--	> 25	--
Dissolved solids*	1,090	1,076	818	1,168	937
Boron (B)	.18	.12	.13	.3	.43
Calcium (Ca)	110	112	104	132	98
Magnesium (Mg)	35	31	19	27	33
Total Hardness ($CaCO_3$)	420	410	340	440	380
Sodium (Na)	216	215	155	205	184
Potassium (K)	--	4.5	4.2	4.9	--
Chloride (Cl)	352	355	245	395	300
Sulfate(SO_4)	260	265	175	275	218
Alkalinity ($CaCO_3$)	121	132	148	120	128
Nitrate (N)	0	--	--	--	.1
Silica(SiO_2)	8.4	6.2	4.6	6.2	6.8
Fluoride (F)	.3	.59	.55	.71	.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 527
Location: Red River at Arthur City, Texas
Basin: Red River
Tributary to: --

Date collected:	5/15/61	5/23/61			
Laboratory:	RATSEC	RATSEC			
Time of collection:	2:25 pm	8:45 am			
Temperature of stream: °F	77	76			
Discharge (cfs)	--	2,940			
Spec. cond. micromhos @ 25° C (field)	1,156	1,700			
Spec. cond. micromhos @ 25° C (lab.)	1,200	1,970			
pH	7.8	7.7			
Turbidity, Jackson units	> 25	33			
Dissolved solids*	713	1,140			
Boron (B)	.1	.17			
Calcium (Ca)	88	116			
Magnesium (Mg)	19	36			
Total Hardness ($CaCO_3$)	300	440			
Sodium (Na)	135	230			
Potassium (K)	4.4	5.0			
Chloride (Cl)	210	365			
Sulfate(SO_4)	165	272			
Alkalinity ($CaCO_3$)	144	132			
Nitrate (N)	--	--			
Silica(SiO_2)	5.0	6.0			
Fluoride (F)	.34	.50			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 526
Location: Clear Boggy Creek near Caney, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	11/2/59	12/8/59	12/28/59	2/15/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	12:05 pm	11:45 am
Temperature of stream: °F	65	--	--	39	--
Discharge (cfs)	48	43	1,400	220	218
Spec. cond. micromhos @ 25° C (field)	--	--	--	720	--
Spec. cond. micromhos @ 25° C (lab.)	1,280	1,000	350	600	697
pH	8.0	7.8	7.3	7.9	8.2
Turbidity, Jackson units	--	< 25	600	32	--
Dissolved solids*	718	645	230	364	407
Boron (B)	0.20	0.17	0.11	0.05	0.11
Calcium (Ca)	119	128	44	53	86
Magnesium (Mg)	25	19	5	17	20
Total Hardness (CaCO$_3$)	400	400	130	216	295
Sodium (Na)	121	90	15	39	(Na+K) 33
Potassium (K)	--	3.0	3.5	2.2	--
Chloride (Cl)	230	145	30	60	68
Sulfate(SO$_4$)	34	39	20	46	39
Alkalinity (CaCO$_3$)	300	220	90	200	228
Nitrate (N)	0.05	0.2	--	--	0.1
Silica(SiO$_2$)	7.5	9.2	12.2	9.5	8.0
Fluoride (F)	0.1	0.0	0.4	0.26	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 526
Location: Clear Boggy Creek near Caney, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	3/1/60	3/22/60	4/25/60	5/16/60	5/25/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	12:15 pm	4:10 pm	4:05 pm	1:45 pm	9:10 am
Temperature of stream: °F	37	71	73	74	--
Discharge (cfs)	477	151	101	135	576
Spec. cond. micromhos @ 25° C (field)	590	700	745	830	--
Spec. cond. micromhos @ 25° C (lab.)	590	680	700	740	593
pH	8.1	8.1	7.9	8.1	7.6
Turbidity, Jackson units	140	< 25	< 25	--	--
Dissolved solids*	350	410	434	497	376
Boron (B)	0.14	0.08	0.025	0.09	0.08
Calcium (Ca)	64	76	80	96	79
Magnesium (Mg)	32	22	70	32	12
Total Hardness ($CaCO_3$)	290	280	490	370	245
Sodium (Na)	35	42	52	40	26
Potassium (K)	2.2	2.6	3.1	3.1	--
Chloride (Cl)	40	70	65	50	53
Sulfate(SO_4)	50	50	38	47	22
Alkalinity ($CaCO_3$)	160	220	200	280	203
Nitrate (N)	--	--	--	--	0.0
Silica(SiO_2)	7.8	6.0	8.4	11.0	11.0
Fluoride (F)	0.4	0.9	0.33	0.20	0.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 526
Location: Clear Boggy Creek near Caney, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	9/13/60	10/11/60	10/18/60	11/15/60	12/13/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	2:30 pm	11:40 am	11:45 am	10:30 am	10:15 am
Temperature of stream: °F	74	--	67	63	73
Discharge (cfs)	8.2	67	48	51	1,580
Spec. cond. micromhos @ 25° C (field)	780	470	325	740	226
Spec. cond. micromhos @ 25° C (lab.)	680	442	480	740	238
pH	7.9	7.1	7.9	7.8	7.5
Turbidity, Jackson units	< 25	--	160	< 25	--
Dissolved solids*	485	270	175	420	138
Boron (B)	0.09	0.19	0.06	0.03	0.04
Calcium (Ca)	62	58	37	83	32
Magnesium (Mg)	30	12	21	22	6
Total Hardness ($CaCO_3$)	280	192	180	300	104
Sodium (Na)	43	20	20	35	8
Potassium (K)	2.7	--	3.5	2.1	4.0
Chloride (Cl)	95	32	30	84	14
Sulfate(SO_4)	16	22	14	27	18
Alkalinity ($CaCO_3$)	236	167	100	148	84
Nitrate (N)	--	0.0	--	--	--
Silica(SiO_2)	8.0	8.8	6.7	8.8	7.2
Fluoride (F)	0.2	0.2	0.4	0.0	0.10

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

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CHEMICAL ANALYSES

PHS Station No.: 526
Location: Clear Boggy Creek near Caney, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	1/17/61	1/23/61	2/14/61	3/13/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:40 am	3:45 pm	9:50 am	3:55 pm	4:00 pm
Temperature of stream: °F	76	73	77	62	--
Discharge (cfs)	108	92	160	95	390
Spec. cond. micromhos @ 25° C (field)	--	1,012	596	660	--
Spec. cond. micromhos @ 25° C (lab.)	712	920	580	630	662
pH	7.9	7.6	7.6	7.3	7.8
Turbidity, Jackson units	--	--	35	< 25	57
Dissolved solids*	453	643	348	354	494
Boron (B)	0.06	0.05	0.02	0.03	0.015
Calcium (Ca)	81	104	76	72	84
Magnesium (Mg)	24	15	12	19	17
Total Hardness ($CaCO_3$)	300	320	240	260	280
Sodium (Na)	(Na+K) 38	62	20	15	5
Potassium (K)	--	2.5	3.0	7.0	9.0
Chloride (Cl)	80	142	62	60	64
Sulfate(SO_4)	30	39	38	43	43
Alkalinity ($CaCO_3$)	238	232	172	188	216
Nitrate (N)	0.0	--	--	--	--
Silica(SiO_2)	7.8	5.3	4.8	7.5	8.2
Fluoride (F)	0.1	0.20	0.08	0.34	0.29

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 526
Location: Clear Boggy Creek near Caney, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	4/17/61	5/22/61			
Laboratory:	USGS	RATSEC			
Time of collection:	3:25 pm	3:30 pm			
Temperature of stream: °F	64	76			
Discharge (cfs)	177	305			
Spec. cond. micromhos @ 25° C (field)	--	1,700			
Spec. cond. micromhos @ 25° C (lab.)	591	416			
pH	8.2	7.3			
Turbidity, Jackson units	--	700			
Dissolved solids*	340	233			
Boron (B)	0.21	0.06			
Calcium (Ca)	77	52			
Magnesium (Mg)	17	17			
Total Hardness ($CaCO_3$)	260	200			
Sodium (Na)	27	12			
Potassium (K)	--	2.8			
Chloride (Cl)	46	34			
Sulfate(SO_4)	33	12			
Alkalinity ($CaCO_3$)	218	128			
Nitrate (N)	0.0	--			
Silica(SiO_2)	7.2	6.6			
Fluoride (F)	0.2	0.40			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 522
Location: Red River near Colbert, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	11/3/59	12/9/59	12/29/59	2/16/60	2/24/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	1:25 pm	12:30 pm
Temperature of stream: °F	67	--	--	47	--
Discharge (cfs)	950	2,130	9,630	4,500	4,990
Spec. cond. micromhos @ 25° C (field)	--	--	--	1,500	--
Spec. cond. micromhos @ 25° C (lab.)	1,860	1,650	1,490	1,440	1,520
pH	7.6	7.7	8.1	7.4	8.0
Turbidity, Jackson units	--	< 25	< 25	< 25	--
Dissolved solids*	1,100	1,140	1,000	945	895
Boron (B)	0.14	0.14	0.16	0.08	.26
Calcium (Ca)	110	120	96	97	94
Magnesium (Mg)	26	15	23	46	28
Total Hardness ($CaCO_3$)	380	360	335	430	350
Sodium (Na)	250	220	195	230	(Na+K) 177
Potassium (K)	--	6	5.3	5.1	--
Chloride (Cl)	385	345	330	270	290
Sulfate(SO_4)	267	500	175	220	207
Alkalinity ($CaCO_3$)	102	100	80	110	108
Nitrate (N)	0.11	--	--	--	.2
Silica(SiO_2)	5.0	6.4	6.1	6.8	5.5
Fluoride (F)	0.3	0.2	0.2	0.24	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 522
Location: Red River near Colbert, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	3/2/60	3/21/60	4/25/60	5/16/60	5/23/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	1:05 pm	3:30 pm	5:50 pm	3:45 pm	4:00 pm
Temperature of stream: ^{o}F	39	68	59	70	--
Discharge (cfs)	5,080	2,420	4,160	2,190	4,860
Spec. cond. micromhos @ 25^{o} C (field)	1,450	1,530	1,500	1,600	--
Spec. cond. micromhos @ 25^{o} C (lab.)	1,500	1,420	1,600	1,460	1,510
pH	7.8	7.5	7.7	7.9	7.7
Turbidity, Jackson units	< 25	< 25	< 25	--	--
Dissolved solids*	930	1,070	945	969	983
Boron (B)	.16	0.10	.06	0.10	.25
Calcium (Ca)	76	100	100	120	107
Magnesium (Mg)	58	24	29	22	25
Total Hardness ($CaCO_3$)	430	350	370	390	370
Sodium (Na)	165	205	188	150	174
Potassium (K)	5.1	5.7	4.8	5.4	--
Chloride (Cl)	240	290	230	270	275
Sulfate(SO_4)	250	190	225	255	220
Alkalinity ($CaCO_3$)	90	120	130	140	130
Nitrate (N)	--	--	--	--	.1
Silica(SiO_2)	5.8	6.9	7.1	7.7	6.8
Fluoride (F)	0.04	0.9	.33	0.22	.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103^{o}C by SEC laboratory and at 180^{o}C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 522
Location: Red River near Colbert, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	6/14/60	6/20/60	7/12/60	7/19/60	8/16/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	3:45 pm	2:45 pm	3:00 pm	2:55 pm	1:30 pm
Temperature of stream: °F	73	71	--	76	74
Discharge (cfs)	3,470	3,720	5,520	5,150	2,300
Spec. cond. micromhos @ 25° C (field)	1,650	1,650	--	1,700	1,900
Spec. cond. micromhos @ 25° C (lab.)	1,460	1,500	1,750	1,650	1,750
pH	8.0	7.7	7.9	7.9	7.9
Turbidity, Jackson units	< 25	< 25	--	< 25	< 25
Dissolved solids*	1,013	980	1,070	1,150	1,210
Boron (B)	0.07	0.3	.25	0.16	0.18
Calcium (Ca)	112	108	110	108	124
Magnesium (Mg)	27	29	31	34	44
Total Hardness ($CaCO_3$)	390	390	400	410	490
Sodium (Na)	165	160	215	232	235
Potassium (K)	4.8	4.8	--	7.5	5.0
Chloride (Cl)	260	310	338	360	390
Sulfate(SO_4)	200	170	253	185	280
Alkalinity ($CaCO_3$)	128	132	126	120	180
Nitrate (N)	--	--	.2	--	--
Silica(SiO_2)	7.4	7.1	7.5	7.6	8.0
Fluoride (F)	0.56	0.5	.3	0.2	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 522
Location: Red River near Colbert, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	9/13/60	10/11/60	10/18/60	11/15/60	12/13/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	1:00 pm	2:10 pm	1:30 pm	11:45 am	12:00 pm
Temperature of stream: °F	77	--	75	63	70.5
Discharge (cfs)	2,900	2,750	6,150	4,970	4,920
Spec. cond. micromhos @ 25° C (field)	2,020	2,000	2,050	2,000	2,090
Spec. cond. micromhos @ 25° C (lab.)	1,900	1,920	1,950	2,080	2,060
pH	7.9	7.7	7.5	7.6	7.4
Turbidity, Jackson units	25	--	< 25	< 25	--
Dissolved solids*	1,190	1,210	1,160	1,220	1,212
Boron (B)	0.17	.38	0.20	0.16	.15
Calcium (Ca)	120	113	112	88	108
Magnesium (Mg)	34	32	36	53	34
Total Hardness ($CaCO_3$)	440	415	430	440	410
Sodium (Na)	235	255	233	290	250
Potassium (K)	5.0	--	5.8	6.2	5.8
Chloride (Cl)	390	398	400	420	395
Sulfate(SO_4)	290	291	290	300	310
Alkalinity ($CaCO_3$)	116	105	104	124	96
Nitrate (N)	--	0	--	--	--
Silica(SiO_2)	8.5	8.0	8.0	7.2	6
Fluoride (F)	0.9	.3	0.6	0.3	.43

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 522
Location: Red River near Colbert, Oklahoma
Basin: Red River
Tributary to:

Date collected:	1/17/61	1/25/61	2/16/61	3/15/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	8:10 am	9:00 am	8:20 am	8:40 am	2:40 pm
Temperature of stream: °F	76	73	77	53	--
Discharge (cfs)	5,190	6,900	2,000	2,080	10,100
Spec. cond. micromhos @ 25° C (field)	--	2,068	2,160	2,000	--
Spec. cond. micromhos @ 25° C (lab.)	2,270	2,080	2,150	2,190	2,112
pH	7.5	7.3	7.45	7.3	7.7
Turbidity, Jackson units	--	--	> 25	< 25	> 25
Dissolved solids*	1,400	1,212	1,339	1,302	1,318
Boron (B)	.18	.15	.15	.13	20
Calcium (Ca)	128	120	124	120	128
Magnesium (Mg)	39	32	34	36	34
Total Hardness ($CaCO_3$)	480	430	450	450	460
Sodium (Na)	294	225	220	200	250
Potassium (K)	--	6.	6.8	24	5.0
Chloride (Cl)	472	420	445	455	425
Sulfate(SO_4)	327	270	315	325	310
Alkalinity ($CaCO_3$)	112	116	108	88	108
Nitrate (N)	0	--	--	--	--
Silica(SiO_2)	8.4	7.3	4.6	6.6	6.6
Fluoride (F)	.3	.43	.34	.45	.60

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 522
Location: Red River near Colbert, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	4/17/61	5/24/61			
Laboratory:	USGS	RATSEC			
Time of collection:	1:55 pm	8:50 am			
Temperature of stream: °F	59	64			
Discharge (cfs)	4,830	1,710			
Spec. cond. micromhos @ 25° C (field)	--	2,180			
Spec. cond. micromhos @ 25° C (lab.)	2,150	2,170			
pH	7.8	7.5			
Turbidity, Jackson units	--	< 25			
Dissolved solids*	1,350	1,321			
Boron (B)	.61	.40			
Calcium (Ca)	123	132			
Magnesium (Mg)	35	36			
Total Hardness ($CaCO_3$)	450	480			
Sodium (Na)	285	300			
Potassium (K)	--	5.8			
Chloride (Cl)	445	440			
Sulfate(SO_4)	313	315			
Alkalinity ($CaCO_3$)	115	120			
Nitrate (N)	.1	--			
Silica(SiO_2)	6.4	6.2			
Fluoride (F)	.3	.60			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 520
Location: Washita River near Durwood, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	11/2/59	12/8/59	12/28/59	2/15/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	10:30 am	9:50 am
Temperature of stream: °F	65	--	--	39	--
Discharge (cfs)	855	422	2,000	1,670	1,210
Spec. cond. micromhos @ 25° C (field)	--	--	--	1,050	--
Spec. cond. micromhos @ 25° C (lab.)	1,360	1,500	610	1,060	1,370
pH	7.9	7.7	7.2	7.6	8.0
Turbidity, Jackson units	--	85	2,000	1,250	--
Dissolved solids*	952	1,260	460	760	974
Boron (B)	0.23	0.23	0.08	0.15	0.14
Calcium (Ca)	170	206	80	124	158
Magnesium (Mg)	50	60	24	46	62
Total Hardness ($CaCO_3$)	630	760	300	640	650
Sodium (Na)	77	190	43	54	(Na+K) 68
Potassium (K)	--	4	4.2	3.6	--
Chloride (Cl)	85	85	50	40	75
Sulfate(SO_4)	401	460	75	230	392
Alkalinity ($CaCO_3$)	258	210	170	290	279
Nitrate (N)	0.56	0.7	--	--	1.0
Silica(SiO_2)	12	19.6	19.0	14.4	13
Fluoride (F)	0.4	0.2	0.9	0.46	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 520
Location: Washita River near Durwood, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	3/1/60	3/23/60	4/25/60	5/18/60	5/25/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	10:30 am	9:15 am	1:55 pm	9:45 am	11:15 am
Temperature of stream: °F	30	68	72	75	--
Discharge (cfs)	1,180	965	660	660	2,570
Spec. cond. micromhos @ 25° C (field)	1,300	1,440	1,400	1,300	--
Spec. cond. micromhos @ 25° C (lab.)	1,300	1,460	1,500	1,340	730
pH	8.0	7.8	7.7	7.6	7.9
Turbidity, Jackson units	450	280	108	--	--
Dissolved solids*	995	1,090	1,227	981	501
Boron (B)	0.10	0.16	0.15	0.12	0.20
Calcium (Ca)	156	160	164	132	81
Magnesium (Mg)	58	75	66	56	30
Total Hardness ($CaCO_3$)	630	710	680	560	325
Sodium (Na)	50	83	83	74	29
Potassium (K)	3.9	4.8	3.7	3.9	--
Chloride (Cl)	70	80	75	90	38
Sulfate(SO_4)	400	380	465	410	153
Alkalinity ($CaCO_3$)	260	280	230	180	174
Nitrate (N)	--	--	--	--	0.1
Silica(SiO_2)	12.6	13.6	11.8	10.6	10
Fluoride (F)	0.4	0.8	0.22	0.30	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 520
Location: Washita River near Durwood, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	6/16/60	6/22/60	7/12/60	7/19/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	11:30 am	10:15 am	9:40 am	9:15 am	4:15 pm
Temperature of stream: °F	80	79	--	82	86
Discharge (cfs)	870	490	466	422	270
Spec. cond. micromhos @ 25° C (field)	1,260	1,120	--	1,300	1,000
Spec. cond. micromhos @ 25° C (lab.)	1,180	1,140	908	1,200	--
pH	7.6	7.4	7.7	7.5	--
Turbidity, Jackson units	1,500	2,000	--	330	88
Dissolved solids*	1,022	879	631	1,014	--
Boron (B)	0.09	0.2	0.20	0.30	0.21
Calcium (Ca)	168	152	94	144	--
Magnesium (Mg)	44	51	38	66	--
Total Hardness ($CaCO_3$)	600	590	390	630	--
Sodium (Na)	50	46	51	90	--
Potassium (K)	7.3	5.0	--	5.0	--
Chloride (Cl)	150	56	58	92	78
Sulfate(SO_4)	380	310	234	425	295
Alkalinity ($CaCO_3$)	200	236	174	164	--
Nitrate (N)	--	--	0.2	--	--
Silica(SiO_2)	12.8	13.6	12	11.1	8.8
Fluoride (F)	0.10	0.5	0.3	0.5	--

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 520
Location: Washita River near Durwood, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	9/13/60	10/11/60	10/18/60	11/14/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	4:15 pm	9:25 am	9:30 am	3:20 pm	4:15 pm
Temperature of stream: °F	79	--	66	64	71
Discharge (cfs)	147	212	--	--	3,620
Spec. cond. micromhos @ 25° C (field)	1,300	1,175	870	1,210	486
Spec. cond. micromhos @ 25° C (lab.)	1,480	1,160	950	1,230	593
pH	7.7	7.8	7.3	7.4	7.2
Turbidity, Jackson units	25	--	> 5,000	340	--
Dissolved solids*	840	819	675	860	324
Boron (B)	0.33	0.46	0.17	0.15	0.10
Calcium (Ca)	116	117	120	148	64
Magnesium (Mg)	63	58	61	46	19
Total Hardness ($CaCO_3$)	550	530	550	560	240
Sodium (Na)	71	55	27	55	20
Potassium (K)	5.0	--	4.4	5.0	3.2
Chloride (Cl)	96	90	34	66	28
Sulfate(SO_4)	405	342	300	340	77
Alkalinity ($CaCO_3$)	130	164	188	260	160
Nitrate (N)	--	0.1	--	--	--
Silica(SiO_2)	10.0	8.0	12.8	11.9	9.0
Fluoride (F)	0.3	0.5	0.5	0.2	0.26

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 520
Location: Washita River near Durwood, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	1/16/61	1/23/61	2/13/61	3/18/61	4/12/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	2:30 pm	2:00 pm	2:30 pm	1:55 pm	10:00 am
Temperature of stream: °F	76.5	73	76	62	--
Discharge (cfs)	564	505	627	--	990
Spec. cond. micromhos @ 25° C (field)	--	1,535	1,430	1,375	--
Spec. cond. micromhos @ 25° C (lab.)	1,380	1,400	1,300	1,620	1,000
pH	8.1	7.5	7.5	7.45	7.4
Turbidity, Jackson units	--	--	42	< 25	290
Dissolved solids*	1,000	1,044	994	976	701
Boron (B)	0.68	0.25	0.22	0.14	0.12
Calcium (Ca)	155	160	148	132	104
Magnesium (Mg)	62	61	63	58	46
Total Hardness ($CaCO_3$)	640	650	630	570	450
Sodium (Na)	75	71	65	85	65
Potassium (K)	--	3	3.9	2.8	3.0
Chloride (Cl)	100	92	98	122	92
Sulfate(SO_4)	386	425	444	425	169
Alkalinity ($CaCO_3$)	258	224	228	184	204
Nitrate (N)	0.4	--	--	--	--
Silica(SiO_2)	12	9.5	7.4	7.5	9.9
Fluoride (F)	0.3	0.16	0.24	0.24	0.55

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 520
Location: Washita River near Durwood, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	4/19/61	5/24/61			
Laboratory:	USGS	RATSEC			
Time of collection:	8:55 am	10:55 am			
Temperature of stream: °F	67	69			
Discharge (cfs)	605	1,345			
Spec. cond. micromhos @ 25° C (field)	--	700			
Spec. cond. micromhos @ 25° C (lab.)	1,200	770			
pH	7.8	6.6			
Turbidity, Jackson units	--	550			
Dissolved solids*	826	502			
Boron (B)	0.55	0.15			
Calcium (Ca)	114	88			
Magnesium (Mg)	56	29			
Total Hardness ($CaCO_3$)	515	340			
Sodium (Na)	75	36			
Potassium (K)	--	3.8			
Chloride (Cl)	102	48			
Sulfate(SO_4)	306	185			
Alkalinity ($CaCO_3$)	215	160			
Nitrate (N)	0.1	--			
Silica(SiO_2)	6.2	8.2			
Fluoride (F)	0.3	0.55			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 508
Location: Red River near Gainesville, Texas
Basin: Red River
Tributary to: --

Date collected:	11/2/59	12/9/59	12/29/59	2/16/60	2/24/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	3:25 pm	2:20 pm
Temperature of stream: °F	64	--	--	45	--
Discharge (cfs)	622	432	3,480	2,040	1,240
Spec. cond. micromhos @ 25° C (field)	--	--	--	3,300	--
Spec. cond. micromhos @ 25° C (lab.)	3,680	3,900	3,300	3,200	3,900
pH	7.4	7.6	7.7	7.7	8.0
Turbidity, Jackson units	--	< 25	500	600	--
Dissolved solids*	2,180	2,820	2,080	2,190	2,590
Boron (B)	0.34	0.34	0.19	0.10	.24
Calcium (Ca)	182	230	178	188	240
Magnesium (Mg)	53	55	52	56	76
Total Hardness ($CaCO_3$)	650	800	660	700	910
Sodium (Na)	541	540	150	450	(Na+K) 530
Potassium (K)	--	7	7.0	6.7	--
Chloride (Cl)	900	980	750	680	885
Sulfate(SO_4)	419	420	325	600	568
Alkalinity ($CaCO_3$)	139	200	170	170	218
Nitrate (N)	0.11	--	--	--	1.0
Silica(SiO_2)	4.0	13.2	11.2	11.0	10
Fluoride (F)	0.3	0.4	0.5	0.29	.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 508
Location: Red River near Gainesville, Texas
Basin: Red River
Tributary to: --

Date collected:	3/2/60	3/21/60	4/27/60	5/16/60	5/23/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	3:00 pm	1:00 pm	9:35 am	10:50 am	2:00 pm
Temperature of stream: °F	34	60	68	--	--
Discharge (cfs)	1,400	850	566	286	3,800
Spec. cond. micromhos @ 25° C (field)	3,500	3,800	4,800	3,900	--
Spec. cond. micromhos @ 25° C (lab.)	3,500	3,700	4,800	3,600	3,230
pH	8.2	8.2	7.6	7.7	7.4
Turbidity, Jackson units	300	175	< 25	--	--
Dissolved solids*	2,700	2,530	3,219	2,470	2,110
Boron (B)	.16	0.20	.17	0.20	.37
Calcium (Ca)	230	236	224	200	164
Magnesium (Mg)	78	68	87	53	59
Total Hardness ($CaCO_3$)	890	870	920	720	650
Sodium (Na)	525	525	720	690	451
Potassium (K)	6.5	7.0	8.4	7.5	--
Chloride (Cl)	860	700	1,150	850	800
Sulfate(SO_4)	625	500	700	475	321
Alkalinity ($CaCO_3$)	210	210	150	120	166
Nitrate (N)	--	--	--	--	.2
Silica(SiO_2)	9.5	8.2	4.0	5.2	10
Fluoride (F)	0.6	0.9	.65	0.40	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 508
Location: Red River near Gainesville, Texas
Basin: Red River
Tributary to: --

Date collected:	6/14/60	6/20/60	7/14/60	7/21/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	1:40 pm	12:10 pm	11:25 am	1:05 pm	3:30 pm
Temperature of stream: °F	81	80	--	83	80
Discharge (cfs)	8,860	2,790	4,320	1,960	--
Spec. cond. micromhos @ 25° C (field)	3,200	4,600	--	4,000	2,600
Spec. cond. micromhos @ 25° C (lab.)	3,000	5,000	6,030	4,100	2,450
pH	8.1	7.9	7.6	7.6	8.1
Turbidity, Jackson units	3,000	> 2,000	--	1,200	49
Dissolved solids*	2,190	3,405	3,950	2,940	1,570
Boron (B)	0.09	0.2	.35	0.30	0.34
Calcium (Ca)	248	320	318	232	144
Magnesium (Mg)	14	44	60	68	41
Total Hardness ($CaCO_3$)	680	980	1,040	860	530
Sodium (Na)	440	690	982	690	360
Potassium (K)	8.6	10.2	--	9.6	7.1
Chloride (Cl)	650	1,190	1,520	1,140	620
Sulfate(SO_4)	562	775	860	525	350
Alkalinity ($CaCO_3$)	128	148	133	136	92
Nitrate (N)	--	--	.7	--	--
Silica(SiO_2)	13.0	13.2	16	12.8	7.8
Fluoride (F)	0.08	0.9	.5	0.6	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 508
Location: Red River near Gainesville, Texas
Basin: Red River
Tributary to: --

Date collected:	9/12/60	10/13/60	10/20/60	11/16/60	12/14/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	10:40 am	9:45 am	10:00 am	1:00 pm	1:00 pm
Temperature of stream: °F	72	--	59	61	73
Discharge (cfs)	335	410	2,790	1,560	9,250
Spec. cond. micromhos @ 25° C (field)	5,500	3,750	1,500	5,000	1,420
Spec. cond. micromhos @ 25° C (lab.)	4,980	3,780	1,660	5,200	1,540
pH	7.9	7.5	7.4	7.4	7.5
Turbidity, Jackson units	67	--	5,000	145	--
Dissolved solids*	3,390	2,420	1,010	3,335	876
Boron (B)	0.40	.39	0.14	0.44	.17
Calcium (Ca)	300	184	152	300	112
Magnesium (Mg)	85	49	117	61	24
Total Hardness ($CaCO_3$)	1,100	660	860	1,000	380
Sodium (Na)	805	576	125	740	196
Potassium (K)	4.5	--	4.8	8.1	4.4
Chloride (Cl)	1,375	935	300	1,325	310
Sulfate(SO_4)	775	468	225	725	150
Alkalinity ($CaCO_3$)	96	107	204	260	128
Nitrate (N)	--	0	--	--	--
Silica(SiO_2)	9.0	8.8	14.5	10.8	9.7
Fluoride (F)	0.4	.3	0.4	0.4	.43

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 508
Location: Red River near Gainesville, Texas
Basin: Red River
Tributary to: --

Date collected:	1/18/61	1/25/61	2/16/61	3/15/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:50 pm	11:45 am	10:35 am	10:45 am	12:40 pm
Temperature of stream: °F	77	73	77	60	7.9
Discharge (cfs)	1,060	984	1,233	596	2,820
Spec. cond. micromhos @ 25° C (field)	--	7,005	5,520	6,000	--
Spec. cond. micromhos @ 25° C (lab.)	5,710	6,800	5,400	6,200	3,936
pH	7.7	7.05	7.6	7.45	--
Turbidity, Jackson units	--	--	> 25	--	250
Dissolved solids*	3,770	4,374	3,513	3,973	2,660
Boron (B)	.41	.38	.35	.37	.27
Calcium (Ca)	296	340	360	256	224
Magnesium (Mg)	93	158	49	112	68
Total Hardness ($CaCO_3$)	1,120	1,500	1,100	1,100	840
Sodium (Na)	850	1,013	775	975	475
Potassium (K)	--	7.5	7.4	7.9	6.5
Chloride (Cl)	1,400	1,775	1,400	1,575	1,150
Sulfate(SO_4)	754	925	950	775	525
Alkalinity ($CaCO_3$)	207	208	168	132	136
Nitrate (N)	.2	--	--	--	--
Silica(SiO_2)	13	8.6	4.8	5.5	7.7
Fluoride (F)	.3	.65	.49	.60	1.18

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 508
Location: Red River near Gainesville, Texas
Basin: Red River
Tributary to:

Date collected:	4/17/61	5/22/61			
Laboratory:	USGS	RATSEC			
Time of collection:	11:45 am	12:40 pm			
Temperature of stream: °F	62	78			
Discharge (cfs)	2,200	3,540			
Spec. cond. micromhos @ 25° C (field)	--	1,900			
Spec. cond. micromhos @ 25° C (lab.)	4,190	2,400			
pH	7.6	7.6			
Turbidity, Jackson units	--	< 5,000			
Dissolved solids*	2,670	1,428			
Boron (B)	.85	.26			
Calcium (Ca)	220	144			
Magnesium (Mg)	68	39			
Total Hardness ($CaCO_3$)	830	520			
Sodium (Na)	613	300			
Potassium (K)	--	6.2			
Chloride (Cl)	980	500			
Sulfate(SO_4)	622	290			
Alkalinity ($CaCO_3$)	131	140			
Nitrate (N)	.1	--			
Silica(SiO_2)	9.0	7.7			
Fluoride (F)	.3	.66			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 507
Location: Red River near Terral, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	10/26/59	12/9/59	12/30/59	2/17/60	2/25/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	10:05 am	11:20 am
Temperature of stream: ^{o}F	64	--	--	41	--
Discharge (cfs)	600	405	2,030	1,470	1,020
Spec. cond. micromhos @ 25^{o} C (field)	--	--	--	3,700	--
Spec. cond. micromhos @ 25^{o} C (lab.)	4,120	4,250	3,500	3,700	4,010
pH	7.7	7.7	7.9	7.6	8.0
Turbidity, Jackson units	--	< 25	550	500	--
Dissolved solids*	2,460	3,130	2,400	2,600	2,680
Boron (B)	0.38	0.32	0.21	0.16	.35
Calcium (Ca)	194	250	192	230	248
Magnesium (Mg)	57	70	102	66	90
Total Hardness ($CaCO_3$)	720	910	900	840	990
Sodium (Na)	622	750	600	555	(Na+K) 515
Potassium (K)	--	7	6.9	6.9	--
Chloride (Cl)	1,020	1,050	910	800	870
Sulfate(SO_4)	478	480	350	600	623
Alkalinity ($CaCO_3$)	135	230	170	200	230
Nitrate (N)	0.52	--	--	--	.9
Silica(SiO_2)	5.0	10.0	11.1	10.8	10
Fluoride (F)	0.3	0.4	1.1	0.50	.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103^{o}C by SEC laboratory and at 180^{o}C by USGS laboratory.

` Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 507
Location: Red River near Terral, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	3/1/60	3/21/60	4/28/60	5/16/60	5/23/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	10:45 pm	11:30 am	11:00 am	8:30 am	10:50 am
Temperature of stream: °F	31	55	68	75	--
Discharge (cfs)	1,060	877	500	384	4,280
Spec. cond. micromhos @ 25° C (field)	3,200	4,250	4,500	3,900	--
Spec. cond. micromhos @ 25° C (lab.)	3,200	4,000	4,200	3,600	1,240
pH	8.1	8.0	8.0	7.8	7.1
Turbidity, Jackson units	45	$<$ 25	32	--	--
Dissolved solids*	2,460	2,980	2,823	2,423	806
Boron (B)	.27	0.22	.18	0.19	.25
Calcium (Ca)	240	240	208	180	92
Magnesium (Mg)	75	80	83	66	21
Total Hardness ($CaCO_3$)	910	930	860	720	315
Sodium (Na)	490	635	635	465	136
Potassium (K)	4.4	8.2	8.7	8.2	--
Chloride (Cl)	770	940	980	1,220	210
Sulfate(SO_4)	600	550	675	550	172
Alkalinity ($CaCO_3$)	220	310	170	150	135
Nitrate (N)	--	--	--	--	.0
Silica(SiO_2)	8.8	8.6	5.0	6.4	8.8
Fluoride (F)	0.8	0.7	.06	0.46	.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 507
Location: Red River near Terral, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	6/14/60	6/20/60	7/14/60	7/21/60	8/18/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	11:45 am	11:15 am	1:40 pm	3:00 pm	11:50 am
Temperature of stream: °F	79	79	--	84	80
Discharge (cfs)	6,300	1,620	2,370	1,720	535
Spec. cond. micromhos @ 25° C (field)	4,650	4,500	--	4,900	5,400
Spec. cond. micromhos @ 25° C (lab.)	4,500	4,500	5,210	4,800	5,000
pH	7.9	7.6	7.5	7.8	7.6
Turbidity, Jackson units	1,500	1,500	--	1,100	53
Dissolved solids*	3,130	2,975	3,380	3,300	3,650
Boron (B)	0.14	0.4	.38	0.34	0.49
Calcium (Ca)	280	272	276	248	296
Magnesium (Mg)	56	61	47	63	95
Total Hardness ($CaCO_3$)	930	930	880	880	1,130
Sodium (Na)	650	563	838	900	845
Potassium (K)	10.2	8.8	--	5.0	8.8
Chloride (Cl)	980	1,010	1,250	1,260	1,380
Sulfate(SO_4)	700	550	770	625	875
Alkalinity ($CaCO_3$)	144	148	135	128	216
Nitrate (N)	--	--	.4	--	--
Silica(SiO_2)	13.0	11.0	16	12.3	9.6
Fluoride (F)	0.20	0.6	.7	0.5	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 507
Location: Red River near Terral, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	9/12/60	10/13/60	10/20/60	11/16/60	12/14/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	8:20 am	12:00 N	11:30 am	2:30 pm	2:45 pm
Temperature of stream: °F	70	--	57	61	72
Discharge (cfs)	215	218	75,800	1,570	4,380
Spec. cond. micromhos @ 25° C (field)	5,400	5,100	1,750	5,000	2,170
Spec. cond. micromhos @ 25° C (lab.)	5,100	5,360	1,840	5,000	2,180
pH	7.8	7.5	7.5	7.6	7.2
Turbidity, Jackson units	40	--	> 500	180	--
Dissolved solids*	3,305	3,550	1,115	3,290	1,250
Boron (B)	0.41	.75	0.15	0.42	.17
Calcium (Ca)	264	292	140	268	116
Magnesium (Mg)	68	76	22	75	32
Total Hardness ($CaCO_3$)	940	1,040	440	980	420
Sodium (Na)	800	838	208	755	238
Potassium (K)	9.8	--	6.0	8.8	5.3
Chloride (Cl)	1,320	1,420	340	1,225	500
Sulfate(SO_4)	750	694	265	800	225
Alkalinity ($CaCO_3$)	112	135	172	260	128
Nitrate (N)	--	.4	--	--	--
Silica(SiO_2)	9.1	9.0	10.15	10.0	8.8
Fluoride (F)	0.8	.3	0.6	0.2	.37

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 507
Location: Red River near Terral, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	1/18/61	1/25/61	2/16/61	3/15/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:25 pm	2:20 pm	1:30 pm	12:40 pm	10:25 am
Temperature of stream: °F	73.5	72	78	62	--
Discharge (cfs)	898	814	1,380	646	2,400
Spec. cond. micromhos @ 25° C (field)	--	6,206	6,631	6,150	--
Spec. cond. micromhos @ 25° C (lab.)	6,820	6,000	6,600	6,200	4,032
pH	7.6	7.25	7.25	7.25	7.5
Turbidity, Jackson units	--	--	725	< 25	130
Dissolved solids*	4,480	3,895	4,419	3,914	2,699
Boron (B)	.48	.33	.29	.41	.265
Calcium (Ca)	340	304	324	324	240
Magnesium (Mg)	105	99	102	85	53
Total Hardness ($CaCO_3$)	1,280	1,170	1,230	1,160	820
Sodium (Na)	(Na+K) 1,110	794	788	850	525
Potassium (K)	--	8.3	9.3	34	6.2
Chloride (Cl)	1,800	1,525	1,725	1,625	950
Sulfate(SO_4)	897	925	900	1,000	650
Alkalinity ($CaCO_3$)	213	200	176	108	144
Nitrate (N)	.6	--	--	--	--
Silica(SiO_2)	12	7.3	5.0	4.8	8.3
Fluoride (F)	.5	.54	.39	.55	.60

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 507
Location: Red River near Terral, Oklahoma
Basin: Red River
Tributary to: --

Date collected:	4/17/61	5/22/61			
Laboratory:	USGS	RATSEC			
Time of collection:	10:20 am	11:00 am			
Temperature of stream: °F	60	78			
Discharge (cfs)	1,420	1,053			
Spec. cond. micromhos @ 25° C (field)	--	2,500			
Spec. cond. micromhos @ 25° C (lab.)	4,380	2,480			
pH	7.5	7.4			
Turbidity, Jackson units	--	210			
Dissolved solids*	2,830	1,492			
Boron (B)	.92	.27			
Calcium (Ca)	236	180			
Magnesium (Mg)	76	36			
Total Hardness ($CaCO_3$)	900	600			
Sodium (Na)	660	300			
Potassium (K)	--	7.3			
Chloride (Cl)	1,050	540			
Sulfate(SO_4)	700	275			
Alkalinity ($CaCO_3$)	125	148			
Nitrate (N)	.1	--			
Silica(SiO_2)	5.8	6.4			
Fluoride (F)	.5	.55			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 704
Location: Little Wichita River near Henrietta, Texas
Basin: Red River Basin
Tributary to: Red River

Date collected:	10/26/59	12/8/59	12/30/59	2/17/60	2/25/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	9:20 am	10:40 am
Temperature of stream: °F	--	--	--	43	--
Discharge (cfs)	0	--	3.6	2.0	0.3
Spec. cond. micromhos @ 25° C (field)	--	--	--	480	--
Spec. cond. micromhos @ 25° C (lab.)	431	1,100	480	410	504
pH	7.2	7.6	7.7	7.7	7.6
Turbidity, Jackson units	--	45	300	320	--
Dissolved solids*	233	730	320	290	299
Boron (B)	0.21	0.11	0.18	0.16	.12
Calcium (Ca)	30	70	34	156	33
Magnesium (Mg)	10	11	8	7	8.1
Total Hardness ($CaCO_3$)	116	220	120	105	116
Sodium (Na)	42	140	80	54	(Na+K) 52
Potassium (K)	--	5	6.1	5.4	--
Chloride (Cl)	76	295	105	80	92
Sulfate(SO_4)	12	12	11	18	7.0
Alkalinity ($CaCO_3$)	86	90	90	90	87
Nitrate (N)	0.16	< 0.1	--	--	.4
Silica(SiO_2)	10	10.4	10.4	9.5	8.0
Fluoride (F)	0.7	0.5	0.3	0.76	.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 704
Location: Little Wichita River near Henrietta, Texas
Basin: Red River Basin
Tributary to: Red River

Date collected:	2/29/60	3/21/60	4/28/60	5/16/60	5/23/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	9:20 am	10:45 am	10:00 am	7:30 am	9:50 am
Temperature of stream: °F	37	53	68	73	--
Discharge (cfs)	.4	0	0	0	10
Spec. cond. micromhos @ 25° C (field)	500	500	2,600	2,500	--
Spec. cond. micromhos @ 25° C (lab.)	470	500	2,400	2,200	3,340
pH	8.0	7.8	7.5	7.6	7.5
Turbidity, Jackson units	160	< 25	< 25	--	--
Dissolved solids*	315	313	1,119	1,550	2,010
Boron (B)	0.18	0.17	.39	0.20	.18
Calcium (Ca)	30	34	120	124	153
Magnesium (Mg)	13	9	36	32	52
Total Hardness ($CaCO_3$)	130	118	450	440	595
Sodium (Na)	60	55	288	300	439
Potassium (K)	5.2	8.2	11.7	8.4	--
Chloride (Cl)	100	100	610	660	1,000
Sulfate(SO_4)	16	16	24	23	13
Alkalinity ($CaCO_3$)	90	100	100	100	125
Nitrate (N)	--	--	--	--	.0
Silica(SiO_2)	7.8	7.6	4.6	5.7	5.0
Fluoride (F)	0.9	0.9	.65	0.30	.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 704
Location: Little Wichita River near Henrietta, Texas
Basin: Red River Basin
Tributary to: Red River

Date collected:	6/13/60	6/20/60	7/14/60	7/21/60	8/18/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	9:00 am	10:30 am	3:00 pm	3:30 pm	1:00 pm
Temperature of stream: °F	79	82	--	84	85
Discharge (cfs)	17.0	1.0	3.6	3.6	0
Spec. cond. micromhos @ 25° C (field)	1,800	1,700	--	640	850
Spec. cond. micromhos @ 25° C (lab.)	1,700	1,650	267	560	850
pH	7.9	7.4	7.3	7.6	8.0
Turbidity, Jackson units	130	25	--	50	210
Dissolved solids*	1,068	970	204	360	460
Boron (B)	0.06	0.1	.29	0.13	0.15
Calcium (Ca)	72	60	21	32	48
Magnesium (Mg)	22	22	3.8	12	27
Total Hardness ($CaCO_3$)	270	240	68	130	230
Sodium (Na)	270	240	31	83	115
Potassium (K)	3.7	4.1	--	10.6	5.0
Chloride (Cl)	480	450	28	160	205
Sulfate(SO_4)	18	18	11	9	13
Alkalinity ($CaCO_3$)	80	84	80	76	116
Nitrate (N)	--	--	.6	--	--
Silica(SiO_2)	6.4	6.2	12	8.0	9.2
Fluoride (F)	0.16	0.6	.3	0.5	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 704
Location: Little Wichita River near Henrietta, Texas
Basin: Red River Basin
Tributary to: Red River

Date collected:	9/12/60	10/13/60	10/20/60	11/16/60	12/14/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	7:35 am	1:45 pm	12:15 pm	3:30 pm	3:35 pm
Temperature of stream: °F	72	--	60	63	74
Discharge (cfs)	0	0	--	--	--
Spec. cond. micromhos @ 25° C (field)	1,020	670	375	525	387
Spec. cond. micromhos @ 25° C (lab.)	930	679	452	625	423
pH	8.1	7.5	7.5	7.8	6.9
Turbidity, Jackson units	190	--	> 5,000	240	--
Dissolved solids*	560	404	245	345	221
Boron (B)	0.10	.38	0.09	0.16	.10
Calcium (Ca)	56	30	29	40	19
Magnesium (Mg)	29	9.5	8	22	7
Total Hardness ($CaCO_3$)	260	114	104	190	76
Sodium (Na)	130	89	43	64	45
Potassium (K)	5.0	--	3.7	5.0	5.5
Chloride (Cl)	240	140	72	112	780
Sulfate(SO_4)	21	10	8	11	3
Alkalinity ($CaCO_3$)	124	98	100	116	56
Nitrate (N)	--	.1	--	--	--
Silica(SiO_2)	9.7	6.5	8.1	9.2	7.8
Fluoride (F)	0.2	.5	0.2	0.3	.15

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 704
Location: Little Wichita River near Henrietta, Texas
Basin: Red River Basin
Tributary to: Red River

Date collected:	1/18/61	1/25/61	2/16/61	3/15/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	4:30 pm	3:10 pm	2:30 pm	1:40 pm	9:40 am
Temperature of stream: °F	74	73	77	70	--
Discharge (cfs)	0.4	0.4	7.6	0	0.1
Spec. cond. micromhos @ 25° C (field)	--	547	702	760	--
Spec. cond. micromhos @ 25° C (lab.)	622	575	680	750	854
pH	7.4	7.4	7.4	7.15	--
Turbidity, Jackson units	--	--	230	130	290
Dissolved solids*	372	363	396	411	456
Boron (B)	.19	.12	.02	.03	1.20
Calcium (Ca)	29	40	32	38	48
Magnesium (Mg)	12	31	19	11	12
Total Hardness ($CaCO_3$)	120	230	160	140	170
Sodium (Na)	(Na+K) 85	58	60	90	100
Potassium (K)	--	4.9	5.8	4.1	4.1
Chloride (Cl)	135	120	160	175	195
Sulfate(SO_4)	22	13	71	13	11
Alkalinity ($CaCO_3$)	89	80	72	92	72
Nitrate (N)	.2	--	--	--	--
Silica(SiO_2)	5.6	6.0	4.6	7.7	6.2
Fluoride (F)	.8	.31	.34	.40	.44

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 704
Location: Little Wichita River near Henrietta, Texas
Basin: Red River Basin
Tributary to: Red River

Date collected:	4/17/61	5/22/61			
Laboratory:	USGS	RATSEC			
Time of collection:	9:40 am	10:20 am			
Temperature of stream: °F	58	79			
Discharge (cfs)	--	0			
Spec. cond. micromhos @ 25° C (field)	--	1,130			
Spec. cond. micromhos @ 25° C (lab.)	809	1,180			
pH	7.6	7.5			
Turbidity, Jackson units	--	50			
Dissolved solids*	480	664			
Boron (B)	.35	1.00			
Calcium (Ca)	35	64			
Magnesium (Mg)	13	19			
Total Hardness ($CaCO_3$)	140	240			
Sodium (Na)	109	140			
Potassium (K)	--	.55			
Chloride (Cl)	196	270			
Sulfate(SO_4)	10	15			
Alkalinity ($CaCO_3$)	87	120			
Nitrate (N)	.3	--			
Silica(SiO_2)	5.8	5.3			
Fluoride (F)	.6	.50			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 700
Location: Beaver Creek near Waurika, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	10/27/59	12/9/59	12/30/59	2/17/60	2/25/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	11:00 am	1:05 pm
Temperature of stream: °F	--	--	--	40	--
Discharge (cfs)	16	32	123	85	56
Spec. cond. micromhos @ 25° C (field)	--	--	--	1,750	--
Spec. cond. micromhos @ 25° C (lab.)	1,540	1,400	950	1,700	1,670
pH	7.7	7.7	7.9	7.7	7.7
Turbidity, Jackson units	--	< 25	400	< 25	--
Dissolved solids*	1,000	1,000	650	1,150	1,090
Boron (B)	0.34	0.12	0.21	0.23	0.22
Calcium (Ca)	157	170	94	124	141
Magnesium (Mg)	59	57	42	80	80
Total Hardness ($CaCO_3$)	635	660	410	640	680
Sodium (Na)	113	120	71	155	(Na+K) 118
Potassium (K)	--	3	4.5	2.7	--
Chloride (Cl)	188	130	90	190	192
Sulfate(SO_4)	265	290	135	310	310
Alkalinity ($CaCO_3$)	338	95	230	310	341
Nitrate (N)	0.11	0.1	--	--	0.4
Silica(SiO_2)	14	14.0	12.2	12.6	10
Fluoride (F)	0.3	0.4	1.0	0.46	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 700
Location: Beaver Creek near Waurika, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	2/29/60	3/23/60	4/25/60	5/18/60	5/25/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	11:05 am	11:15 am	11:20 am	12:05 pm	1:30 pm
Temperature of stream: $^{\circ}$F	33	71	68	73	--
Discharge (cfs)	76	53	40	34	118
Spec. cond. micromhos @ 25° C (field)	1,500	1,550	1,600	1,500	--
Spec. cond. micromhos @ 25° C (lab.)	1,500	1,460	1,570	1,360	1,330
pH	7.9	7.9	8.0	8.1	8.2
Turbidity, Jackson units	< 25	< 25	< 25	--	--
Dissolved solids*	1,056	1,120	1,224	1,080	913
Boron (B)	0.15	0.14	0.22	0.14	0.33
Calcium (Ca)	112	124	140	168	136
Magnesium (Mg)	70	80	68	51	46
Total Hardness (CaCO$_3$)	570	640	630	630	530
Sodium (Na)	110	141	128	80	88
Potassium (K)	2.4	2.9	3.7	6.3	--
Chloride (Cl)	130	160	170	120	145
Sulfate(SO$_4$)	300	250	310	300	206
Alkalinity (CaCO$_3$)	290	300	340	330	300
Nitrate (N)	--	--	--	--	0.2
Silica(SiO$_2$)	11.6	8.2	12.6	16.0	14
Fluoride (F)	0.6	0.8	0.30	0.60	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 700
Location: Beaver Creek near Waurika, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	6/15/60	6/22/60	7/11/60	7/18/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	2:15 pm	1:30 pm	1:25 pm	1:05 pm	2:45 pm
Temperature of stream: °F	81	82	--	84	71
Discharge (cfs)	29	18	40	18	7.0
Spec. cond. micromhos @ 25° C (field)	1,200	1,400	--	1,560	900
Spec. cond. micromhos @ 25° C (lab.)	1,100	1,300	842	1,470	--
pH	8.2	7.9	7.5	7.9	--
Turbidity, Jackson units	110	47	--	98	65
Dissolved solids*	870	896	491	984	--
Boron (B)	0.15	0.4	0.17	0.31	0.24
Calcium (Ca)	128	116	59	124	--
Magnesium (Mg)	56	61	27	43	--
Total Hardness ($CaCO_3$)	550	540	260	500	--
Sodium (Na)	58	88	76	170	--
Potassium (K)	4.0	3.8	--	6.9	--
Chloride (Cl)	60	145	138	310	110
Sulfate(SO_4)	255	200	69	160	125
Alkalinity ($CaCO_3$)	280	292	157	256	--
Nitrate (N)	--	--	0.2	--	--
Silica(SiO_2)	12.6	11.9	10	10.1	9.0
Fluoride (F)	0.10	0.6	0.3	0.5	--

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 700
Location: Beaver Creek near Waurika, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	9/14/60	10/10/60	10/17/60	11/14/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	9:15 am	1:30 pm	1:45 pm	1:15 pm	2:30 pm
Temperature of stream: °F	80	--	64	57	71
Discharge (cfs)	0	1.1	16	9.6	253
Spec. cond. micromhos @ 25° C (field)	1,190	410	350	1,080	586
Spec. cond. micromhos @ 25° C (lab.)	1,025	398	375	1,070	608
pH	8.2	7.5	7.9	7.8	7.2
Turbidity, Jackson units	< 25	--	> 5,000	< 25	--
Dissolved solids*	705	253	215	750	371
Boron (B)	0.30	0.32	0.15	0.16	0.10
Calcium (Ca)	100	32	38	128	68
Magnesium (Mg)	61	12	13	44	19
Total Hardness ($CaCO_3$)	500	130	152	500	250
Sodium (Na)	74	36	15	52	22
Potassium (K)	4.4	--	4.6	5.5	4.4
Chloride (Cl)	105	30	30	48	32
Sulfate(SO_4)	200	29	45	250	108
Alkalinity ($CaCO_3$)	292	135	108	224	152
Nitrate (N)	--	0.3	--	--	--
Silica(SiO_2)	9.7	11	6.7	14.0	10.8
Fluoride (F)	0.8	0.2	0.2	0.5	0.43

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 700
Location: Beaver Creek near Waurika, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	1/16/61	1/23/61	2/13/61	3/13/61	4/18/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:25 pm	11:50 am	1:00 pm	11:50 am	12:25 pm
Temperature of stream: °F	73	72	78	56	--
Discharge (cfs)	28	23	38	22	45
Spec. cond. micromhos @ 25° C (field)	--	1,477	1,228	1,420	--
Spec. cond. micromhos @ 25° C (lab.)	1,420	1,400	1,150	1,340	1,030
pH	7.7	7.5	7.3	7.2	7.8
Turbidity, Jackson units	--	--	> 25	< 25	183
Dissolved solids*	1,120	940	798	877	714
Boron (B)	0.20	0.19	0.2	0.195	0.16
Calcium (Ca)	139	128	116	100	100
Magnesium (Mg)	63	61	46	70	41
Total Hardness ($CaCO_3$)	605	570	480	540	420
Sodium (Na)	(Na+K) 83	80	55	90	70
Potassium (K)	--	2.5	3.9	2.1	4.1
Chloride (Cl)	140	144	102	138	120
Sulfate(SO_4)	262	235	215	285	165
Alkalinity ($CaCO_3$)	315	224	272	236	240
Nitrate (N)	0.1	--	--	--	--
Silica(SiO_2)	15	9.7	7.8	6.6	9.7
Fluoride (F)	0.5	0.65	0.59	0.60	0.60

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 700
Location: Beaver Creek near Waurika, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	4/19/61	5/24/61			
Laboratory:	USGS	RATSEC			
Time of collection:	11:40 am	1:00 pm			
Temperature of stream: °F	67	69			
Discharge (cfs)	45	51			
Spec. cond. micromhos @ 25° C (field)	--	1,400			
Spec. cond. micromhos @ 25° C (lab.)	1,720	1,320			
pH	8.2	7.3			
Turbidity, Jackson units	--	45			
Dissolved solids*	1,110	896			
Boron (B)	0.44	27			
Calcium (Ca)	134	120			
Magnesium (Mg)	68	58			
Total Hardness ($CaCO_3$)	615	540			
Sodium (Na)	148	100			
Potassium (K)	--	5.5			
Chloride (Cl)	240	161			
Sulfate(SO_4)	263	195			
Alkalinity ($CaCO_3$)	323	288			
Nitrate (N)	0.1	--			
Silica(SiO_2)	9.4	11.2			
Fluoride (F)	0.5	0.66			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 503
Location: Wichita River at Wichita Falls, Texas
Basin: Red River
Tributary to: Red River

Date collected:	10/26/59	12/8/59	12/29/59	2/17/60	2/25/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	2:55 pm	3:00 pm
Temperature of stream: °F	65	--	--	40	--
Discharge (cfs)	94	60	77	44	44
Spec. cond. micromhos @ 25° C (field)	--	--	--	6,000	--
Spec. cond. micromhos @ 25° C (lab.)	5,750	5,500	5,000	6,000	7,180
pH	7.7	7.6	7.8	7.8	8.0
Turbidity, Jackson units	--	< 25	< 25	< 25	--
Dissolved solids*	3,520	4,390	3,500	3,770	4,550
Boron (B)	0.65	0.44	0.50	0.21	0.58
Calcium (Ca)	316	310	252	260	354
Magnesium (Mg)	100	115	114	122	165
Total Hardness ($CaCO_3$)	1,200	1,250	1,100	1,150	1,560
Sodium (Na)	829	900	700	755	(Na+K) 992
Potassium (K)	--	7	6.2	5.7	--
Chloride (Cl)	1,550	1,550	1,200	--	2,050
Sulfate(SO_4)	588	620	450	500	585
Alkalinity ($CaCO_3$)	200	155	180	180	217
Nitrate (N)	1.0	--	--	--	0.1
Silica(SiO_2)	9.0	9.6	11.0	5.4	7.5
Fluoride (F)	0.2	0.5	0.5	0.40	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 503
Location: Wichita River at Wichita Falls, Texas
Basin: Red River
Tributary to: Red River

Date collected:	2/29/60	3/23/60	4/28/60	5/18/60	5/26/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	1:20 pm	1:35 pm	8:25 am	4:00 pm	9:15 am
Temperature of stream: °F	35	65	64	--	--
Discharge (cfs)	--	28	90	450	114
Spec. cond. micromhos @ 25° C (field)	6,900	7,000	4,500	2,000	--
Spec. cond. micromhos @ 25° C (lab.)	6,200	6,400	4,600	1,950	4,090
pH	7.9	7.6	7.6	7.4	7.8
Turbidity, Jackson units	25	< 25	< 25	--	--
Dissolved solids*	4,490	4,680	2,645	1.230	2,660
Boron (B)	0.56	0.27	0.18	0.15	0.45
Calcium (Ca)	305	316	244	104	168
Magnesium (Mg)	150	156	95	49	66
Total Hardness ($CaCO_3$)	1,400	1,430	1,000	460	690
Sodium (Na)	1,050	950	635	265	613
Potassium (K)	14.7	7.5	7.6	5.9	--
Chloride (Cl)	1,800	1,800	1,120	550	1,200
Sulfate(SO_4)	575	700	575	115	212
Alkalinity ($CaCO_3$)	160	210	160	130	108
Nitrate (N)	--	--	--	--	0.2
Silica(SiO_2)	5.6	21.6	5.2	8.0	7.5
Fluoride (F)	0.5	0.8	0.54	0.26	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 503
Location: Wichita River at Wichita Falls, Texas
Basin: Red River
Tributary to: Red River

Date collected:	6/15/60	6/22/60	7/11/60	7/18/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	5:00 pm	4:15 pm	9:40 am	10:00 am	10:30 am
Temperature of stream: °F	85	85	--	83	80
Discharge (cfs)	--	62	190	134	148
Spec. cond. micromhos @ 25° C (field)	3,400	5,000	--	4,200	4,000
Spec. cond. micromhos @ 25° C (lab.)	3,600	4,800	3,440	3,900	3,700
pH	7.9	7.8	7.3	7.7	8.0
Turbidity, Jackson units	50	< 25	--	< 25	< 25
Dissolved solids*	2,420	3,540	2,150	2,720	2,620
Boron (B)	0.19	0.6	0.56	0.50	0.56
Calcium (Ca)	200	280	184	236	216
Magnesium (Mg)	58	87	50	73	87
Total Hardness ($CaCO_3$)	740	1,060	665	890	900
Sodium (Na)	510	690	493	615	590
Potassium (K)	6.9	7.3	--	6.2	8.1
Chloride (Cl)	790	1,360	820	1,100	1,000
Sulfate(SO_4)	462	1,400	450	525	650
Alkalinity ($CaCO_3$)	140	148	110	136	132
Nitrate (N)	--	--	0.2	--	--
Silica(SiO_2)	6.2	7.8	9.0	9.0	8.0
Fluoride (F)	0.64	0.6	0.3	0.5	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 503
Location: Wichita River at Wichita Falls, Texas
Basin: Red River
Tributary to: Red River

Date collected:	9/14/60	10/10/60	10/17/60	11/14/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	1:00 pm	10:00 am	10:30 am	10:15 am	11:00 am
Temperature of stream: °F	78	--	64	60	74.5
Discharge (cfs)	108	43	231	550	1,180
Spec. cond. micromhos @ 25° C (field)	4,500	5,200	1,550	3,250	1,110
Spec. cond. micromhos @ 25° C (lab.)	4,250	5,940	1,530	3,330	1,156
pH	7.9	7.6	7.6	7.7	7.4
Turbidity, Jackson units	< 25	--	> 5,000	52	--
Dissolved solids*	2,735	3,970	855	2,120	648
Boron (B)	0.56	0.82	0.17	0.47	0.15
Calcium (Ca)	224	276	54	180	68
Magnesium (Mg)	78	137	35	58	22
Total Hardness ($CaCO_3$)	880	1,250	280	690	260
Sodium (Na)	615	878	175	455	129
Potassium (K)	5.8	--	6.0	7.0	5.0
Chloride (Cl)	1,125	1,700	380	755	250
Sulfate(SO_4)	590	571	75	500	70
Alkalinity ($CaCO_3$)	184	166	84	96	100
Nitrate (N)	--	0	--	--	--
Silica(SiO_2)	7.9	4.0	7.5	6.2	8.4
Fluoride (F)	0.2	0.3	0.4	0.4	0.15

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 503
Location: Wichita River at Wichita Falls, Texas
Basin: Red River
Tributary to: Red River

Date collected:	1/16/61	1/25/61	2/13/61	3/13/61	4/12/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:50 am	9:45 am	10:20 am	9:50 am	3:15 pm
Temperature of stream: °F	74	73	78	56	--
Discharge (cfs)	56.0	--	54.0	160.0	788.0
Spec. cond. micromhos @ 25° C (field)	--	6,837	6,534	1,650	--
Spec. cond. micromhos @ 25° C (lab.)	6,180	6,600	6,360	2,040	3,264
pH	7.7	7.55	7.5	7.55	7.7
Turbidity, Jackson units	--	--	> 25	1,000	61
Dissolved solids*	4,130	4,018	4,046	1,132	2,027
Boron (B)	1.8	0.51	0.37	0.27	0.3
Calcium (Ca)	320	328	284	100	184
Magnesium (Mg)	120	141	131	41	53
Total Hardness ($CaCO_3$)	1,290	1,400	1,250	420	680
Sodium (Na)	916	750	725	240	400
Potassium (K)	--	5.3	6.9	4.1	5.5
Chloride (Cl)	1,750	1,850	1,900	460	700
Sulfate(SO_4)	590	675	51	140	500
Alkalinity ($CaCO_3$)	198	224	152	152	96
Nitrate (N)	0	--	--	--	--
Silica(SiO_2)	4.2	6.2	2.4	10.0	4.0
Fluoride (F)	0.5	0.43	0.54	0.45	1.18

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 503
Location: Wichita River at Wichita Falls, Texas
Basin: Red River
Tributary to: Red River

Date collected:	4/17/61	5/22/61			
Laboratory:	USGS	RATSEC			
Time of collection:	8:05 am	9:25 am			
Temperature of stream: °F	57	78			
Discharge (cfs)	255.0	172.0			
Spec. cond. micromhos @ 25° C (field)	--	4,200			
Spec. cond. micromhos @ 25° C (lab.)	3,640	4,200			
pH	8.0	7.6			
Turbidity, Jackson units	--	300			
Dissolved solids*	2,330	2,603			
Boron (B)	0.79	0.53			
Calcium (Ca)	196	240			
Magnesium (Mg)	56	73			
Total Hardness ($CaCO_3$)	720	900			
Sodium (Na)	517	615			
Potassium (K)	--	7.3			
Chloride (Cl)	850	1,050			
Sulfate(SO_4)	483	462			
Alkalinity ($CaCO_3$)	141	152			
Nitrate (N)	0.1	--			
Silica(SiO_2)	4.8	7.7			
Fluoride (F)	0.5	0.55			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 751
Location: Beaver Creek near Electra, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	10/26/59	12/8/59	12/29/59	2/17/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	9:20 am	9:35 am
Temperature of stream: °F	--	--	--	43	--
Discharge (cfs)	--	--	--	6.7	10.3
Spec. cond. micromhos @ 25° C (field)	--	--	--	2,250	--
Spec. cond. micromhos @ 25° C (lab.)	1,800	4,850	1,050	2,150	1,520
pH	7.4	7.6	7.2	7.9	7.9
Turbidity, Jackson units	--	< 25	160	26	--
Dissolved solids*	928	3,665	710	1,300	880
Boron (B)	0.29	0.23	0.34	0.15	0.20
Calcium (Ca)	100	280	62	96	72
Magnesium (Mg)	44	160	28	49	38
Total Hardness ($CaCO_3$)	430	1,340	270	440	335
Sodium (Na)	187	650	150	290	(Na+K) 182
Potassium (K)	--	5	4.6	4.5	--
Chloride (Cl)	465	1,500	290	600	420
Sulfate(SO_4)	49	170	25	43	23
Alkalinity ($CaCO_3$)	128	240	100	110	112
Nitrate (N)	0.16	--	--	--	0.2
Silica(SiO_2)	5.0	14.0	8.2	8.0	4.0
Fluoride (F)	0.1	0.4	0.3	0.40	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na

CHEMICAL ANALYSES

PHS Station No.: 751
Location: Beaver Creek near Electra, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	2/29/60	3/23/60	4/27/60	5/19/60	5/23/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	2:40 pm	11:35 am	10:45 am	10:00 am	11:10 am
Temperature of stream: °F	37	56	68	68	--
Discharge (cfs)	1.6	1.4	4.7	10	--
Spec. cond. micromhos @ 25° C (field)	8,000	9,000	11,000	3,900	--
Spec. cond. micromhos @ 25° C (lab.)	7,500	7,400	11,600	3,600	407
pH	7.6	7.8	7.2	7.8	7.9
Turbidity, Jackson units	< 25	155	< 25	--	--
Dissolved solids*	5,510	5,371	6,531	2,370	246
Boron (B)	0.34	0.08	.04	0.05	.29
Calcium (Ca)	320	344	512	144	34
Magnesium (Mg)	182	192	279	58	9.5
Total Hardness ($CaCO_3$)	1,550	1,670	2,430	600	124
Sodium (Na)	1,650	1,125	1,750	605	36
Potassium (K)	6.9	4.5	3.6	7.3	--
Chloride (Cl)	2,600	2,980	4,200	1,140	36
Sulfate (SO_4)	85	74	66	33	22
Alkalinity ($CaCO_3$)	130	140	130	110	126
Nitrate (N)	--	--	--	--	.3
Silica (SiO_2)	3.2	1.0	1.6	5.6	9.0
Fluoride (F)	0.4	0.9	.85	0.36	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 751
Location: Beaver Creek near Electra, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	6/16/60	6/23/60	7/14/60	7/21/60	8/17/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	12:25 pm	1:50 pm	12:20 pm	12:15 pm	1:40 pm
Temperature of stream: °F	83	92	--	79	86
Discharge (cfs)	3.0	0	5.5	119	9.8
Spec. cond. micromhos @ 25° C (field)	1,015	2,200	--	4,250	3,000
Spec. cond. micromhos @ 25° C (lab.)	880	1,860	1,840	3,750	2,700
pH	8.1	7.8	7.6	7.4	8.0
Turbidity, Jackson units	75	< 25	--	1,500	< 25
Dissolved solids*	521	1,285	1,090	2,425	1,720
Boron (B)	0.12	0.4	.18	0.23	0.38
Calcium (Ca)	60	104	66	156	116
Magnesium (Mg)	22	58	28	75	58
Total Hardness ($CaCO_3$)	240	500	280	700	530
Sodium (Na)	95	205	245	575	390
Potassium (K)	5.2	6.0	--	4.2	6.5
Chloride (Cl)	165	465	500	1,260	970
Sulfate(SO_4)	34	93	18	25	40
Alkalinity ($CaCO_3$)	132	200	89	100	152
Nitrate (N)	--	--	.1	--	--
Silica(SiO_2)	7.5	8.0	9.0	7.0	7.5
Fluoride (F)	0.39	0.5	.3	0.5	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	751
Location:	Beaver Creek near Electra, Texas
Basin:	Red River Basin
Tributary to:	Wichita River

Date collected:	9/14/60	10/11/60	10/18/60	11/16/60	12/14/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	12:10 pm	4:40 pm	5:10 pm	3:15 pm	12:25 am
Temperature of stream: °F	78	--	64	56	73.5
Discharge (cfs)	1.4	3.2	5,600	3.8	18
Spec. cond. micromhos @ 25° C (field)	1,700	3,800	380	10,800	1,870
Spec. cond. micromhos @ 25° C (lab.)	1,480	3,690	640	10,400	1,842
pH	8.3	7.6	7.4	7.3	7.0
Turbidity, Jackson units	56	--	> 5,000	< 25	--
Dissolved solids*	895	2,290	340	6,370	994
Boron (B)	0.20	.72	0.09	0.05	.10
Calcium (Ca)	68	146	54	388	78
Magnesium (Mg)	29	61	16	177	34
Total Hardness ($CaCO_3$)	290	615	204	1,700	336
Sodium (Na)	170	525	45	53	215
Potassium (K)	2.1	--	2.1	7.0	5.3
Chloride (Cl)	450	1,150	90	3,550	500
Sulfate(SO_4)	33	40	8	85	27
Alkalinity ($CaCO_3$)	152	94	188	120	84
Nitrate (N)	--	.0	--	--	--
Silica(SiO_2)	6.0	4.0	6.2	6.1	8.4
Fluoride (F)	0.6	.1	0.3	0.4	.20

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 751
Location: Beaver Creek near Electra, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	1/18/61	1/25/61	2/15/61	3/15/61	4/12/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:10 am	9:05 am	2:35 pm	11:20 am	10:45 am
Temperature of stream: °F	79	69	76.5	64	--
Discharge (cfs)	2	1	2	3	8
Spec. cond. micromhos @ 25° C (field)	--	13,050	10,800	2,680	--
Spec. cond. micromhos @ 25° C (lab.)	10,400	12,000	10,300	2,640	6,000
pH	7.6	7.3	7.3	7.25	--
Turbidity, Jackson units	--	--	> 25	< 25	32
Dissolved solids*	6,560	7,052	6,815	1,540	3,734
Boron (B)	.43	.26	.20	.10	.12
Calcium (Ca)	414	500	420	112	300
Magnesium (Mg)	257	352	231	68	194
Total Hardness ($CaCO_3$)	2,090	2,700	2,000	560	1,550
Sodium (Na)	(Na+K) 1,490	1,500	1,250	285	788
Potassium (K)	--	6.9	9.9	5	4.5
Chloride (Cl)	3,600	4,350	3,450	735	2,050
Sulfate(SO_4)	118	165	41	64	75
Alkalinity ($CaCO_3$)	135	148	128	128	168
Nitrate (N)	.1	--	--	--	--
Silica(SiO_2)	4.0	2.6	1.8	6.4	9.4
Fluoride (F)	.2	.48	.39	.45	.50

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 751
Location: Beaver Creek near Electra, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	4/19/61	5/24/61			
Laboratory:	USGS	RATSEC			
Time of collection:	4:25 pm	1:45 pm			
Temperature of stream: °F	79	75			
Discharge (cfs)	4	7			
Spec. cond. micromhos @ 25° C (field)	--	2,100			
Spec. cond. micromhos @ 25° C (lab.)	7,350	2,170			
pH	7.9	7.4			
Turbidity, Jackson units	--	< 25			
Dissolved solids*	4,820	1,197			
Boron (B)	.50	.27			
Calcium (Ca)	320	104			
Magnesium (Mg)	190	78			
Total Hardness ($CaCO_3$)	1,580	580			
Sodium (Na)	957	275			
Potassium (K)	--	7.9			
Chloride (Cl)	2,350	530			
Sulfate(SO_4)	117	78			
Alkalinity ($CaCO_3$)	226	172			
Nitrate (N)	.0	--			
Silica(SiO_2)	5.0	6.2			
Fluoride (F)	.0	.50			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 752
Location: Wichita River near Mabelle, Texas
Basin: Red River
Tributary to: Red River

Date collected:	10/29/59	12/8/59	12/29/59	2/17/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	11:10 am	11:00 am
Temperature of stream: °F	--	--	--	45	--
Discharge (cfs)	230	128	3	3	3
Spec. cond. micromhos @ 25° C (field)	--	--	--	3,500	--
Spec. cond. micromhos @ 25° C (lab.)	3,740	3,600	3,350	3,700	3,650
pH	7.3	7.7	7.9	7.8	7.8
Turbidity, Jackson units	--	< 25	< 25	< 25	--
Dissolved solids*	2,350	2,390	2,330	2,390	2,340
Boron (B)	0.79	--	0.52	0.16	0.48
Calcium (Ca)	224	230	200	200	210
Magnesium (Mg)	46	33	49	44	50
Total Hardness ($CaCO_3$)	750	710	700	680	730
Sodium (Na)	551	750	510	505	(Na+K) 533
Potassium (K)	--	8.0	6.7	6.7	--
Chloride (Cl)	880	810	800	800	850
Sulfate(SO_4)	587	500	550	600	558
Alkalinity ($CaCO_3$)	95	80	80	110	108
Nitrate (N)	0.14	--	--	--	0.1
Silica(SiO_2)	6.5	13.2	8.4	7.2	5.5
Fluoride (F)	0.3	0.4	0.6	0.36	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.:	752
Location:	Wichita River near Mabelle, Texas
Basin:	Red River
Tributary to:	Red River

Date collected:	2/29/60	3/21/60	4/25/60	5/16/60	5/26/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	1:30 pm	11:00 am	10:15 am	10:00 am	8:55 am
Temperature of stream: °F	39	44	64	66	--
Discharge (cfs)	3	209	422	151	4
Spec. cond. micromhos @ 25° C (field)	3,450	3,550	4,000	--	--
Spec. cond. micromhos @ 25° C (lab.)	3,400	3,500	3,800	4,200	4,010
pH	8.0	7.7	7.7	7.6	7.9
Turbidity, Jackson units	< 25	< 25	< 25	--	--
Dissolved solids*	2,420	2,460	2,565	2,500	2,620
Boron (B)	0.56	0.34	0.16	0.31	0.70
Calcium (Ca)	195	186	204	240	224
Magnesium (Mg)	58	46	58	32	49
Total Hardness ($CaCO_3$)	730	680	750	730	760
Sodium (Na)	575	580	540	575	609
Potassium (K)	5.9	7.8	2.7	6.8	--
Chloride (Cl)	650	860	800	850	950
Sulfate(SO_4)	575	425	650	700	597
Alkalinity ($CaCO_3$)	110	80	90	100	121
Nitrate (N)	--	--	--	--	0.1
Silica(SiO_2)	6.2	5.4	4.4	8.0	7.5
Fluoride (F)	0.6	0.9	0.49	0.26	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 752
Location: Wichita River near Mabelle, Texas
Basin: Red River
Tributary to: Red River

Date collected:	6/16/60	6/23/60	7/14/60	7/21/60	8/17/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	8:55 am	11:50 am	11:00 am	11:00 am	12:45 pm
Temperature of stream: °F	71	75	--	78	80
Discharge (cfs)	7	318	286	202	259
Spec. cond. micromhos @ 25° C (field)	4,300	4,250	--	4,100	4,000
Spec. cond. micromhos @ 25° C (lab.)	4,150	4,100	3,970	3,400	3,700
pH	7.8	7.8	7.5	7.6	7.7
Turbidity, Jackson units	35	< 25	--	< 25	< 25
Dissolved solids*	2,714	2,645	2,590	2,495	2,470
Boron (B)	0.21	0.7	0.64	0.59	0.64
Calcium (Ca)	232	228	220	200	236
Magnesium (Mg)	44	46	48	51	41
Total Hardness ($CaCO_3$)	760	760	745	710	760
Sodium (Na)	590	550	592	538	580
Potassium (K)	8.6	3.9	--	7.2	6.9
Chloride (Cl)	910	920	940	910	930
Sulfate(SO_4)	562	525	595	550	650
Alkalinity ($CaCO_3$)	120	100	85	84	92
Nitrate (N)	--	--	0.2	--	--
Silica(SiO_2)	6.2	5.3	7.5	6.0	6.0
Fluoride (F)	0.08	0.6	0.3	0.2	0.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 752
Location: Wichita River near Mabelle, Texas
Basin: Red River
Tributary to: Red River

Date collected:	9/12/60	10/10/60	10/17/60	11/16/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	10:05 am	9:45 am	10:25 am	2:00 pm	10:00 am
Temperature of stream: °F	78	--	65	60	73
Discharge (cfs)	202	3	5	5	4
Spec. cond. micromhos @ 25° C (field)	4,000	4,050	4,000	3,500	3,620
Spec. cond. micromhos @ 25° C (lab.)	3,710	4,110	4,000	3,450	3,380
pH	7.9	7.5	7.3	7.5	7.4
Turbidity, Jackson units	< 25	--	< 25	< 25	--
Dissolved solids*	2,540	2,660	2,530	2,200	2,155
Boron (B)	0.68	1.0	0.67	0.55	0.52
Calcium (Ca)	220	216	216	200	192
Magnesium (Mg)	49	55	49	44	46
Total Hardness ($CaCO_3$)	750	765	740	680	670
Sodium (Na)	540	617	506	440	456
Potassium (K)	6.6	--	10.0	6.2	6.2
Chloride (Cl)	950	950	940	790	740
Sulfate(SO_4)	615	634	600	500	537
Alkalinity ($CaCO_3$)	164	105	84	112	100
Nitrate (N)	--	0.0	--	--	--
Silica(SiO_2)	6.0	5.0	6.2	5.8	6.6
Fluoride (F)	0.2	0.3	0.2	0.3	0.37

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 752
Location: Wichita River near Mabelle, Texas
Basin: Red River
Tributary to: Red River

Date collected:	1/16/61	1/23/61	2/13/61	3/13/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:50 am	9:50 am	10:00 am	10:10 am	9:45 am
Temperature of stream: °F	81	70	76.5	53	78
Discharge (cfs)	4	4	3	829	879
Spec. cond. micromhos @ 25° C (field)	--	3,786	3,740	3,650	--
Spec. cond. micromhos @ 25° C (lab.)	4,280	3,700	3,700	3,820	3,552
pH	7.5	7.6	7.65	7.4	--
Turbidity, Jackson units	--	--	> 25	< 25	> 25
Dissolved solids*	2,690	2,192	2,295	2,334	2,292
Boron (B)	1.7	0.48	0.63	0.465	0.54
Calcium (Ca)	220	192	196	200	200
Magnesium (Mg)	56	51	51	46	44
Total Hardness ($CaCO_3$)	780	690	700	690	680
Sodium (Na)	640	431	415	475	425
Potassium (K)	--	5.5	7.4	6.5	5.8
Chloride (Cl)	1,000	850	800	880	820
Sulfate(SO_4)	622	538	39	581	556
Alkalinity ($CaCO_3$)	112	704	116	72	76
Nitrate (N)	0.1	--	--	--	--
Silica(SiO_2)	6.8	6.0	4.0	4.6	4.4
Fluoride (F)	0.5	0.43	0.44	0.45	0.40

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 752
Location: Wichita River near Mabelle, Texas
Basin: Red River
Tributary to: Red River

Date collected:	4/17/61	5/24/61			
Laboratory:	USGS	RATSEC			
Time of collection:	11:05 am	12:40 pm			
Temperature of stream: °F	59	72			
Discharge (cfs)	9	654			
Spec. cond. micromhos @ 25° C (field)	--	3,800			
Spec. cond. micromhos @ 25° C (lab.)	3,930	4,000			
pH	7.8	7.4			
Turbidity, Jackson units	--	< 25			
Dissolved solids*	2,420	2,342			
Boron (B)	0.84	0.60			
Calcium (Ca)	210	204			
Magnesium (Mg)	53	53			
Total Hardness ($CaCO_3$)	740	730			
Sodium (Na)	568	650			
Potassium (K)	--	6.9			
Chloride (Cl)	900	840			
Sulfate(SO_4)	573	588			
Alkalinity ($CaCO_3$)	108	80			
Nitrate (N)	0	--			
Silica(SiO_2)	4.0	4.2			
Fluoride (F)	0.3	0.50			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 758
Location: Wichita River near Seymour, Texas
Basin: Red River
Tributary to: Red River

Date collected:	10/29/59	12/8/59	12/29/59	2/17/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	11:55 am	12:05 pm
Temperature of stream: °F	64	--	--	42	--
Discharge (cfs)	--	18	74	29	27
Spec. cond. micromhos @ 25° C (field)	--	--	--	17,000	--
Spec. cond. micromhos @ 25° C (lab.)	12,100	17,000	10,500	17,500	18,900
pH	7.7	7.8	7.8	7.5	7.8
Turbidity, Jackson units	--	35	< 25	< 25	--
Dissolved solids*	7,900	13,100	7,400	12,500	13,200
Boron (B)	1.2	0.16	0.78	0.30	0.94
Calcium (Ca)	594	820	512	776	866
Magnesium (Mg)	124	205	126	224	272
Total Hardness ($CaCO_3$)	750	2,890	1,800	2,860	3,280
Sodium (Na)	2,110	3,300	790	3,100	(Na+K) 3,440
Potassium (K)	--	15.0	12.0	18.4	--
Chloride (Cl)	880	5,450	3,200	4,700	5,770
Sulfate(SO_4)	587	1,500	1,650	2,180	2,400
Alkalinity ($CaCO_3$)	95	120	110	140	129
Nitrate (N)	0.14	--	--	--	--
Silica(SiO_2)	6.5	7.2	7.0	4.5	5.5
Fluoride (F)	0.3	1.2	1.0	0.36	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 758
Location: Wichita River near Seymour, Texas
Basin: Red River
Tributary to: Red River

Date collected:	2/29/60	3/21/60	4/25/60	5/16/60	5/23/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	12:45 pm	12:05 pm	11:20 am	11:25 am	11:15 am
Temperature of stream: °F	34	61	64	77	--
Discharge (cfs)	33	22	26	82	720
Spec. cond. micromhos @ 25° C (field)	19,500	20,500	22,500	12,000	--
Spec. cond. micromhos @ 25° C (lab.)	18,000	18,000	22,500	11,200	1,810
pH	7.9	7.7	7.4	7.8	7.8
Turbidity, Jackson units	50	< 25	400	--	--
Dissolved solids*	13,800	14,190	16,430	7,800	1,020
Boron (B)	2.2	0.34	0.18	0.29	0.80
Calcium (Ca)	785	856	944	408	90
Magnesium (Mg)	220	248	291	224	23
Total Hardness ($CaCO_3$)	2,850	3,160	3,560	1,940	320
Sodium (Na)	3,500	3,750	4,500	1,880	216
Potassium (K)	18.5	33.0	50	22.0	--
Chloride (Cl)	5,700	6,000	7,100	3,000	325
Sulfate(SO_4)	2,350	2,125	2,650	1,550	240
Alkalinity ($CaCO_3$)	130	130	120	110	80
Nitrate (N)	--	--	--	--	0.2
Silica(SiO_2)	3.2	5.8	5.0	7.8	10
Fluoride (F)	0.8	0.6	1.0	0.40	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	758
Location:	Wichita River near Seymour, Texas
Basin:	Red River
Tributary to:	Red River

Date collected:	6/13/60	6/20/60	7/11/60	7/18/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	10:25 am	11:25 am	10:30 am	10:02 am	9:30 am
Temperature of stream: °F	78	85	--	85	77
Discharge (cfs)	256	68	224	114	7
Spec. cond. micromhos @ 25° C (field)	2,975	7,000	--	4,400	13,000
Spec. cond. micromhos @ 25° C (lab.)	2,700	6,900	3,160	4,200	11,600
pH	7.8	7.6	7.4	7.7	7.8
Turbidity, Jackson units	1,500	52	--	350	34
Dissolved solids*	1,938	4,115	2,120	2,880	8,470
Boron (B)	0.10	0.9	0.42	0.59	1.20
Calcium (Ca)	224	360	240	272	620
Magnesium (Mg)	29	93	36	56	219
Total Hardness ($CaCO_3$)	680	1,200	745	910	2,450
Sodium (Na)	335	965	403	645	2,025
Potassium (K)	8.6	11.2	--	7.2	14.0
Chloride (Cl)	560	1,675	640	980	3,650
Sulfate(SO_4)	488	850	614	750	1,580
Alkalinity ($CaCO_3$)	104	104	79	88	104
Nitrate (N)	--	--	0.1	--	--
Silica(SiO_2)	7.5	9.1	10	9.4	9.2
Fluoride (F)	0.06	1.0	0.3	0.4	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 758
Location: Wichita River near Seymour, Texas
Basin: Red River
Tributary to: Red River

Date collected:	9/12/60	10/10/60	10/17/60	11/14/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	10:55 am	10:25 am	11:00 am	11:00 am	10:55 am
Temperature of stream: °F	70	--	60	63	73
Discharge (cfs)	2	10	1,780	65	236
Spec. cond. micromhos @ 25° C (field)	12,000	15,500	2,900	15,000	6,390
Spec. cond. micromhos @ 25° C (lab.)	10,600	15,200	2,940	14,450	6,080
pH	7.9	7.7	7.3	7.7	7.3
Turbidity, Jackson units	< 25	--	> 5,000	< 25	--
Dissolved solids*	7,775	10,800	1,960	9,600	3,884
Boron (B)	1.4	1.8	0.38	0.82	0.68
Calcium (Ca)	620	716	256	700	320
Magnesium (Mg)	170	200	34	182	85
Total Hardness ($CaCO_3$)	2,250	2,610	780	2,500	1,150
Sodium (Na)	1,875	2,760	353	2,375	863
Potassium (K)	12.0	--	7.0	15.0	6.8
Chloride (Cl)	3,450	4,480	575	4,250	1,550
Sulfate(SO_4)	1,700	2,110	600	1,950	875
Alkalinity ($CaCO_3$)	184	94	164	132	80
Nitrate (N)	--	0	--	--	--
Silica(SiO_2)	9.6	4.0	8.5	7.5	5.2
Fluoride (F)	0.6	0.5	0.5	0.5	0.31

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 758
Location: Wichita River near Seymour, Texas
Basin: Red River
Tributary to: Red River

Date collected:	1/16/61	1/23/61	2/13/61	3/13/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:30 am	10:25 am	10:40 am	10:55 am	10:25 am
Temperature of stream: °F	80	70	76.5	57	--
Discharge (cfs)	48	42	47	34	51
Spec. cond. micromhos @ 25° C (field)	--	18,177	17,200	19,500	--
Spec. cond. micromhos @ 25° C (lab.)	17,100	16,500	14,800	18,100	13,344
pH	7.7	7.5	7.5	7.4	7.6
Turbidity, Jackson units	--	--	> 25	< 25	> 25
Dissolved solids*	12,100	11,662	11,389	12,783	9,786
Boron (B)	3.2	1.38	1.1	1.40	0.6
Calcium (Ca)	814	780	740	840	720
Magnesium (Mg)	231	231	206	243	231
Total Hardness ($CaCO_3$)	2,980	2,900	2,700	3,100	2,750
Sodium (Na)	3,100	2,825	2,150	3,075	2,000
Potassium (K)	--	13.1	18.2	17.5	13.7
Chloride (Cl)	5,210	5,400	5,000	5,700	4,050
Sulfate(SO_4)	2,140	2,250	--	2,550	2,125
Alkalinity ($CaCO_3$)	137	136	120	108	120
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	7.4	4.0	2.6	4.0	4.8
Fluoride (F)	0.4	0.70	0.39	0.45	0.50

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 758
Location: Wichita River near Seymour, Texas
Basin: Red River
Tributary to: Red River

Date collected:	4/17/61	5/22/61			
Laboratory:	USGS	RATSEC			
Time of collection:	Noon	9:40 am			
Temperature of stream: °F	64	76			
Discharge (cfs)	36	72			
Spec. cond. micromhos @ 25° C (field)	--	9,100			
Spec. cond. micromhos @ 25° C (lab.)	17,000	9,000			
pH	8.1	7.4			
Turbidity, Jackson units	--	250			
Dissolved solids*	20,100	6,061			
Boron (B)	3.1	1.00			
Calcium (Ca)	1,160	540			
Magnesium (Mg)	235	61			
Total Hardness ($CaCO_3$)	3,100	1,600			
Sodium (Na)	3,000	1,538			
Potassium (K)	--	12.5			
Chloride (Cl)	4,970	2,350			
Sulfate (SO_4)	2,380	1,350			
Alkalinity ($CaCO_3$)	137	96			
Nitrate (N)	0	--			
Silica (SiO_2)	5.0	7.5			
Fluoride (F)	0.5	0.42			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	756
Location:	South Fork of Wichita River near Benjamin, Texas
Basin:	Red River
Tributary to:	Wichita River

Date collected:	10/29/59	12/8/59	12/29/59	2/17/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	2:15 pm	2:15 pm
Temperature of stream: °F	65	--	--	44	--
Discharge (cfs)	0	5.4	5.8	7.3	6.4
Spec. cond. micromhos @ 25° C (field)	--	--	--	31,000	--
Spec. cond. micromhos @ 25° C (lab.)	34,200	34,000	23,000	30,000	31,800
pH	7.5	7.8	7.8	7.3	7.9
Turbidity, Jackson units	--	< 25	< 25	42	--
Dissolved solids*	23,800	26,000	17,600	21,700	22,400
Boron (B)	3.6	0.72	0.90	0.10	2.8
Calcium (Ca)	1,410	1,550	892	1,090	1,210
Magnesium (Mg)	317	190	294	330	358
Total Hardness ($CaCO_3$)	4,820	4,650	3,440	4,060	4,490
Sodium (Na)	7,000	7,000	4,650	6,050	(Na+K) 6,450
Potassium (K)	--	34.0	23.5	38.0	--
Chloride (Cl)	11,700	12,000	8,300	9,300	10,700
Sulfate(SO_4)	3,290	2,700	3,000	3,250	3,180
Alkalinity ($CaCO_3$)	107	110	90	130	120
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	4.0	5.6	5.6	3.9	4.9
Fluoride (F)	0.4	1.7	1.0	0.69	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 756
Location: South Fork of Wichita River near Benjamin, Texas
Basin: Red River
Tributary to: Wichita River

Date collected:	2/29/60	3/21/60	4/25/60	5/16/60	5/23/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	11:20 am	2:05 pm	12:30 pm	1:30 pm	1:25 pm
Temperature of stream: °F	33	67	73	87	--
Discharge (cfs)	7.3	4.2	4.1	1.6	1.0
Spec. cond. micromhos @ 25° C (field)	33,000	35,000	40,000	44,000	--
Spec. cond. micromhos @ 25° C (lab.)	30,000	32,000	40,000	42,000	34,600
pH	8.0	7.6	7.5	7.5	7.6
Turbidity, Jackson units	25	< 25	< 25	--	--
Dissolved solids*	22,200	25,470	31,650	32,925	25,600
Boron (B)	2.9	0.55	0.43	0.50	3.7
Calcium (Ca)	1,120	1,280	1,480	1,520	1,300
Magnesium (Mg)	280	336	607	583	396
Total Hardness ($CaCO_3$)	3,950	4,600	6,200	6,200	4,870
Sodium (Na)	6,750	7,350	8,600	12,100	7,050
Potassium (K)	37.0	48.0	12.3	57.0	--
Chloride (Cl)	9,800	11,700	14,100	15,000	11,800
Sulfate(SO_4)	3,400	2,400	3,700	3,700	3,340
Alkalinity ($CaCO_3$)	110	110	130	120	90
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	3.2	3.0	2.6	3.6	7.4
Fluoride (F)	0.9	0.6	1.2	1.17	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 756
Location: South Fork of Wichita River near Benjamin, Texas
Basin: Red River
Tributary to: Wichita River

Date collected:	6/13/60	6/20/60	7/11/60	7/18/60	10/10/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	USGS
Time of collection:	12:35 pm	1:25 pm	12:15 pm	12:05 pm	11:55 am
Temperature of stream: °F	84	94	--	86	--
Discharge (cfs)	17.0	2.2	24	25	0.6
Spec. cond. micromhos @ 25° C (field)	15,000	26,500	--	10,000	25,000
Spec. cond. micromhos @ 25° C (lab.)	14,000	23,500	11,100	9,400	24,200
pH	7.6	7.5	7.4	8.0	7.5
Turbidity, Jackson units	95	95	--	182	--
Dissolved solids*	10,585	18,700	7,630	6,570	17,600
Boron (B)	0.07	2.5	1.2	0.80	2.7
Calcium (Ca)	736	1,200	598	336	999
Magnesium (Mg)	146	282	89	10	260
Total Hardness ($CaCO_3$)	2,440	4,160	1,860	880	3,560
Sodium (Na)	2,700	4,500	1,910	1,650	4,930
Potassium (K)	18.5	30	--	9.5	--
Chloride (Cl)	3,720	8,100	3,090	2,880	8,160
Sulfate(SO_4)	1,700	2,325	1,510	1,250	2,580
Alkalinity ($CaCO_3$)	88	112	72	76	88
Nitrate (N)	--	--	0.1	--	--
Silica(SiO_2)	5.8	7.3	9.0	7.5	7.4
Fluoride (F)	0.50	0.8	0.3	0.3	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 756
Location: South Fork of Wichita River near Benjamin, Texas
Basin: Red River
Tributary to: Wichita River

Date collected:	10/17/60	11/14/60	12/12/60	1/16/61	1/23/61
Laboratory:	RATSEC	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	12:30 pm	12:50 pm	2:35 am	12:05 pm	12:15 pm
Temperature of stream: °F	61	65	74	80	70
Discharge (cfs)	476	17	23	10	10
Spec. cond. micromhos @ 25° C (field)	2,300	24,000	21,000	--	28,305
Spec. cond. micromhos @ 25° C (lab.)	2,500	22,800	20,000	25,900	24,250
pH	7.3	7.4	7.3	7.8	7.35
Turbidity, Jackson units	> 5,000	< 25	--	--	--
Dissolved solids*	1,615	15,860	14,046	18,600	17,566
Boron (B)	0.44	1.8	1.50	4.1	2.07
Calcium (Ca)	232	1,020	880	1,060	1,060
Magnesium (Mg)	19	267	219	305	304
Total Hardness ($CaCO_3$)	660	3,650	3,100	3,900	3,900
Sodium (Na)	250	4,050	3,600	5,160	4,500
Potassium (K)	6.5	23.2	21.3	--	24.5
Chloride (Cl)	475	7,400	6,200	8,520	8,800
Sulfate(SO_4)	475	2,650	2,450	2,860	2,700
Alkalinity ($CaCO_3$)	188	152	116	136	148
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	10.6	7.2	5.2	7.9	3.5
Fluoride (F)	0.2	0.8	0.60	0.4	0.98

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 756
Location: South Fork of Wichita River near Benjamin, Texas
Basin: Red River
Tributary to: Wichita River

Date collected:	2/13/61	3/13/61	4/10/61	4/17/61	5/22/61
Laboratory:	RATSEC	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	12:00 pm	12:30 pm	11:55 am	1:30 pm	10:30 am
Temperature of stream: °F	77	62	7.5	70	78
Discharge (cfs)	9	5	9	6	26
Spec. cond. micromhos @ 25° C (field)	25,000	30,000	--	--	19,500
Spec. cond. micromhos @ 25° C (lab.)	24,000	28,000	22,560	27,200	19,000
pH	7.5	7.2	--	8.0	7.45
Turbidity, Jackson units	> 25	< 25	> 25	--	75
Dissolved solids*	17,649	20,517	16,503	20,100	13,301
Boron (B)	1.9	1.94	1.4	3.1	1.70
Calcium (Ca)	1,000	1,140	1,040	1,160	940
Magnesium (Mg)	279	352	316	349	255
Total Hardness ($CaCO_3$)	3,650	4,300	3,900	4,330	3,400
Sodium (Na)	4,125	5,313	3,812	5,340	3,900
Potassium (K)	30.8	28.3	8.8	--	24.3
Chloride (Cl)	8,050	9,500	7,500	8,870	5,650
Sulfate(SO_4)	3,300	3,200	3,000	3,150	2,650
Alkalinity ($CaCO_3$)	128	132	136	148	148
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	2.2	3.3	5.1	6.5	6.2
Fluoride (F)	0	0.45	0.55	0.5	0.81

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 757
Location: North Fork of Wichita River near Truscott, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	10/29/59	12/8/59	12/29/59	2/17/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	2:40 pm	3:05 pm
Temperature of stream: °F	62	--	--	45	--
Discharge (cfs)	--	13	22	18	15
Spec. cond. micromhos @ 25° C (field)	--	--	--	19,300	--
Spec. cond. micromhos @ 25° C (lab.)	20,200	19,500	13,000	19,000	19,300
pH	7.6	7.9	7.6	7.7	7.6
Turbidity, Jackson units	--	< 25	< 25	< 25	--
Dissolved solids*	13,800	15,100	9,620	13,400	13,800
Boron (B)	2.1	0.54	0.80	0.11	1.5
Calcium (Ca)	882	880	540	750	863
Magnesium (Mg)	187	190	158	200	225
Total Hardness (CaCO$_3$)	2,970	3,000	2,000	2,760	3,080
Sodium (Na)	3,920	4,800	830	3,550	(Na+K) 3,630
Potassium (K)	--	180	14.2	18.6	--
Chloride (Cl)	6,140	6,400	4,200	5,200	5,800
Sulfate(SO$_4$)	2,640	1,500	2,250	2,550	2,570
Alkalinity (CaCO$_3$)	93	110	110	120	114
Nitrate (N)	--	--	--	--	--
Silica(SiO$_2$)	1.5	3.2	5.6	2.8	3.0
Fluoride (F)	0.5	1.6	0.8	0.84	.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 757
Location: North Fork of Wichita River near Truscott, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	2/29/60	3/21/60	4/25/60	5/16/60	5/23/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	10:55 am	2:45 pm	1:05 pm	2:50 pm	2:50 pm
Temperature of stream: °F	34	66	73	86	--
Discharge (cfs)	17	14	15	22	94
Spec. cond. micromhos @ 25° C (field)	19,000	20,500	24,000	19,000	--
Spec. cond. micromhos @ 25° C (lab.)	18,000	18,200	22,000	17,000	5,600
pH	8.0	7.5	7.3	7.6	7.6
Turbidity, Jackson units	< 25	< 25	< 25	--	--
Dissolved solids*	13,060	14,330	16,870	13,150	3,770
Boron (B)	1.1	0.49	.35	0.48	.87
Calcium (Ca)	780	816	912	800	308
Magnesium (Mg)	190	238	258	204	66
Total Hardness ($CaCO_3$)	2,700	3,020	3,340	2,840	1,040
Sodium (Na)	3,750	3,850	4,050	3,500	877
Potassium (K)	18.0	275.0	42.5	90.0	--
Chloride (Cl)	5,400	5,900	7,100	5,300	1,350
Sulfate(SO_4)	2,400	2,325	3,050	1,800	937
Alkalinity ($CaCO_3$)	120	110	110	110	66
Nitrate (N)	--	--	--	--	.1
Silica(SiO_2)	3.2	0.8	1.8	5.2	8.0
Fluoride (F)	1.0	0.6	.80	0.76	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 757
Location: North Fork of Wichita River near Truscott, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	6/13/60	6/20/60	7/11/60	7/18/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	2:25 pm	3:20 pm	2:45 pm	12:50 pm	12:10 pm
Temperature of stream: °F	81	90	--	88	85
Discharge (cfs)	310	21	78	46	7.5
Spec. cond. micromhos @ 25° C (field)	7,000	10,000	--	6,500	19,100
Spec. cond. micromhos @ 25° C (lab.)	6,300	9,000	5,440	5,500	16,500
pH	7.7	7.5	7.4	7.5	7.8
Turbidity, Jackson units	1,500	40	--	105	< 25
Dissolved solids*	4,382	6,525	3,720	4,250	12,850
Boron (B)	0.21	0.1	.76	0.66	1.30
Calcium (Ca)	364	464	340	352	940
Magnesium (Mg)	80	107	54	102	194
Total Hardness ($CaCO_3$)	1,110	1,600	1,070	1,200	3,150
Sodium (Na)	1,125	1,510	841	1,045	3,380
Potassium (K)	12.1	14.0	--	13.2	17.5
Chloride (Cl)	1,600	2,600	1,300	1,550	5,450
Sulfate(SO_4)	750	1,075	932	900	2,280
Alkalinity ($CaCO_3$)	140	100	94	100	80
Nitrate (N)	--	--	.1	--	--
Silica(SiO_2)	7.2	8.5	12	9.0	9.0
Fluoride (F)	0.36	0.7	.3	0.3	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 757
Location: North Fork of Wichita River near Truscott, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	9/12/60	10/10/60	10/17/60	11/14/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	12:50 pm	12:35 pm	1:15 pm	1:30 pm	3:00 pm
Temperature of stream: $^{\circ}$F	82	--	64	67	73
Discharge (cfs)	8.3	9.1	320	27	36
Spec. cond. micromhos @ 25° C (field)	14,000	20,900	4,640	14,500	13,100
Spec. cond. micromhos @ 25° C (lab.)	12,500	20,500	4,550	14,150	12,940
pH	7.8	7.6	7.6	7.4	7.2
Turbidity, Jackson units	< 25	--	> 5,000	< 25	--
Dissolved solids*	9,460	14,800	2,940	9,700	8,821
Boron (B)	1.3	2.3	0.50	1.5	1.03
Calcium (Ca)	720	871	296	680	620
Magnesium (Mg)	207	267	53	170	170
Total Hardness ($CaCO_3$)	2,650	3,270	960	2,700	2,250
Sodium (Na)	2,325	4,020	594	2,500	2,250
Potassium (K)	13.5	--	10.5	14.5	12.5
Chloride (Cl)	4,000	6,440	1,050	4,000	3,500
Sulfate(SO_4)	2,025	2,730	700	2,050	1,950
Alkalinity ($CaCO_3$)	124	76	124	116	124
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	6.0	3.0	8.1	5.6	5.8
Fluoride (F)	1.3	.5	0.2	0.5	.65

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 757
Location: North Fork of Wichita River near Truscott, Texas
Basin: Red River Basin
Tributary to: Wichita River

Date collected:	1/16/61	1/23/61	2/13/61	3/13/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	12:30 pm	12:45 pm	12:30 pm	1:05 pm	12:15 pm
Temperature of stream: °F	80	70	76.5	62	--
Discharge (cfs)	23	25	28	23	25
Spec. cond. micromhos @ 25° C (field)	--	17,760	15,800	19,000	--
Spec. cond. micromhos @ 25° C (lab.)	16,400	16,250	15,200	17,800	14,880
pH	7.7	7.4	7.5	7.2	7.4
Turbidity, Jackson units	--	--	> 25	< 25	> 25
Dissolved solids*	11,[illegible]0	11,288	10,789	12,513	11,328
Boron (B)	2.0	1.38	1.0	1.45	2.3
Calcium (Ca)	770	740	700	800	760
Magnesium (Mg)	209	194	219	194	231
Total Hardness ($CaCO_3$)	2,780	2,650	2,650	2,800	2,850
Sodium (Na)	3,060	2,875	2,075	3,000	2,425
Potassium (K)	--	15.7	20.3	15.7	13.8
Chloride (Cl)	4,840	4,950	4,400	5,250	4,550
Sulfate(SO_4)	2,360	2,350	39	2,650	2,475
Alkalinity ($CaCO_3$)	139	136	124	92	108
Nitrate (N)	.4	--	--	--	--
Silica(SiO_2)	5.5	5.3	2.4	2.4	3.6
Fluoride (F)	.7	.87	.44	.50	.55

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 757
Location: North Fork of Wichita River near Truscott, Texas
Basin: Red River
Tributary to: Wichita River

Date collected:	4/17/61	5/22/61			
Laboratory:	USGS	RATSEC			
Time of collection:	2:15 pm	11:10 am			
Temperature of stream: °F	71	81			
Discharge (cfs)	22	17			
Spec. cond. micromhos @ 25° C (field)	--	21,000			
Spec. cond. micromhos @ 25° C (lab.)	18,100	20,000			
pH	7.9	7.3			
Turbidity, Jackson units	--	< 25			
Dissolved solids*	13,200	13,837			
Boron (B)	1.9	1.20			
Calcium (Ca)	833	880			
Magnesium (Mg)	236	219			
Total Hardness ($CaCO_3$)	3,050	3,100			
Sodium (Na)	3,460	4,375			
Potassium (K)	--	18.9			
Chloride (Cl)	5,450	6,000			
Sulfate(SO_4)	2,670	2,700			
Alkalinity ($CaCO_3$)	101	100			
Nitrate (N)	--	--			
Silica(SiO_2)	2.6	3.6			
Fluoride (F)	.5	.76			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 771
Location: North Fork of Wichita River near Paducah, Texas
Basin: Red River
Tributary to: Wichita River

Date collected:	9/24/62				
Laboratory:	--				
Time of collection:	--				
Temperature of stream: ^{o}F	--				
Discharge (cfs)	4.4				
Spec. cond. micromhos @ 25^{o} C (field)	--				
Spec. cond. micromhos @ 25^{o} C (lab.)	18,500				
pH	7.7				
Turbidity, Jackson units	< 25				
Dissolved solids*	15,000				
Boron (B)	1.5				
Calcium (Ca)	690				
Magnesium (Mg)	150				
Total Hardness ($CaCO_3$)	2,300				
Sodium (Na)	4,800				
Potassium (K)	37				
Chloride (Cl)	7,000				
Sulfate(SO_4)	2,000				
Alkalinity ($CaCO_3$)	74				
Nitrate (N)	--				
Silica(SiO_2)	2.0				
Fluoride (F)	2.0				

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103^{o}C by SEC laboratory and at 180^{o}C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 500
Location: Cache Creek near Walters, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	10/27/59	12/9/59	12/30/59	2/17/60	2/25/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	12:25 pm	1:40 pm
Temperature of stream: °F	57	--	--	42	38
Discharge (cfs)	72	56	204	196	220
Spec. cond. micromhos @ 25° C (field)	--	--	--	780	--
Spec. cond. micromhos @ 25° C (lab.)	882	800	750	725	882
pH	7.8	7.7	8.0	7.4	7.7
Turbidity, Jackson units	--	< 25	180	< 25	--
Dissolved solids*	548	633	520	490	547
Boron (B)	0.21	0.25	0.19	0.12	0.24
Calcium (Ca)	106	120	96	94	110
Magnesium (Mg)	20	19	29	19	26
Total Hardness ($CaCO_3$)	345	380	360	330	380
Sodium (Na)	64	80	43	45	(Na+K) 45
Potassium (K)	--	4	3.3	3.0	--
Chloride (Cl)	62	65	55	38	55
Sulfate(SO_4)	98	130	150	115	142
Alkalinity ($CaCO_3$)	281	275	200	240	248
Nitrate (N)	2.71	2.5	--	--	1.3
Silica(SiO_2)	13.0	9.6	15.6	10.4	10.0
Fluoride (F)	0.5	0.3	0.4	0.46	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 500
Location: Cache Creek near Walters, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	3/1/60	3/23/60	4/25/60	5/18/60	5/25/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	1:05 pm	11:15 am	10:40 am	1:05 pm	3:00 pm
Temperature of stream: °F	32	54	67	74	--
Discharge (cfs)	--	80	60	52	80
Spec. cond. micromhos @ 25° C (field)	850	920	950	880	--
Spec. cond. micromhos @ 25° C (lab.)	1,050	860	960	820	805
pH	7.9	7.7	7.4	7.7	6.9
Turbidity, Jackson units	< 25	25	41	--	--
Dissolved solids*	696	610	614	558	533
Boron (B)	0.27	0.24	0.16	0.24	0.19
Calcium (Ca)	68	100	104	88	94
Magnesium (Mg)	22	26	17	27	18
Total Hardness ($CaCO_3$)	360	360	330	330	310
Sodium (Na)	95	72	72	60	53
Potassium (K)	3.3	3.9	5.2	6.2	--
Chloride (Cl)	110	60	65	60	56
Sulfate(SO_4)	150	155	115	110	144
Alkalinity ($CaCO_3$)	240	260	280	250	197
Nitrate (N)	--	--	--	--	0
Silica(SiO_2)	9.5	6.0	9.2	13.2	11.0
Fluoride (F)	0.4	0.8	0.45	0.48	0.2

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 500
Location: Cache Creek near Walters, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	6/15/60	6/22/60	7/11/60	7/18/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	3:00 pm	2:30 pm	12:45 pm	12:10 pm	12:45 pm
Temperature of stream: °F	78	83	--	80	78
Discharge (cfs)	56	38	29	25	20
Spec. cond. micromhos @ 25° C (field)	725	660	--	700	730
Spec. cond. micromhos @ 25° C (lab.)	760	720	498	660	--
pH	8.1	7.9	7.5	8.0	--
Turbidity, Jackson units	150	65	--	142	41
Dissolved solids*	458	520	285	450	--
Boron (B)	0.17	0.3	0.25	0.36	0.30
Calcium (Ca)	76	88	42	62	--
Magnesium (Mg)	19	22	9.5	16	--
Total Hardness ($CaCO_3$)	270	310	144	220	--
Sodium (Na)	52	65	49	79	--
Potassium (K)	5.9	6.0	--	3.0	--
Chloride (Cl)	42	70	43	70	74
Sulfate(SO_4)	90	50	35	50	55
Alkalinity ($CaCO_3$)	192	164	148	224	--
Nitrate (N)	--	--	1.2	--	--
Silica(SiO_2)	9.4	10.1	12.0	13.2	10.6
Fluoride (F)	0.10	0.7	0.5	0.7	--

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 500
Location: Cache Creek near Walters, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	9/14/60	10/10/60	10/17/60	11/14/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	10:30 am	12:30 pm	12:45 pm	12:25 pm	1:00 pm
Temperature of stream: °F	71	--	65	55	75.5
Discharge (cfs)	13	16	23	31	711
Spec. cond. micromhos @ 25° C (field)	800	720	350	660	275
Spec. cond. micromhos @ 25° C (lab.)	710	662	420	660	330
pH	8.1	7.6	7.7	7.3	7.4
Turbidity, Jackson units	53	--	430	< 25	--
Dissolved solids*	440	411	240	390	186
Boron (B)	0.33	0.46	0.18	0.18	0.07
Calcium (Ca)	64	54	58	69	33
Magnesium (Mg)	17	13	3	12	8
Total Hardness ($CaCO_3$)	230	190	156	220	116
Sodium (Na)	72	71	23	58	19
Potassium (K)	8.8	--	5.8	6.8	5.5
Chloride (Cl)	68	60	20	52	20
Sulfate(SO_4)	53	43	25	51	24
Alkalinity ($CaCO_3$)	224	203	148	232	108
Nitrate (N)	--	2.7	--	--	--
Silica(SiO_2)	13.2	16.0	8.5	12.3	10.4
Fluoride (F)	0.8	1.0	0.5	0.3	0.26

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 500
Location: Cache Creek near Walters, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	1/16/61	1/23/61	2/13/61	3/13/61	4/12/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:35 am	11:00 am	12:10 pm	11:05 am	1:45 pm
Temperature of stream: °F	79	73	78	56	--
Discharge (cfs)	54	45	77	25	80
Spec. cond. micromhos @ 25° C (field)	--	830	717	900	--
Spec. cond. micromhos @ 25° C (lab.)	782	780	790	900	653
pH	7.6	7.2	7.3	7.15	7.7
Turbidity, Jackson units	--	--	42	< 25	100
Dissolved solids*	487	585	429	545	378
Boron (B)	0.32	0.19	0.14	0.235	0.115
Calcium (Ca)	81	84	72	96	68
Magnesium (Mg)	26	22	17	21	12
Total Hardness ($CaCO_3$)	310	300	250	330	220
Sodium (Na)	(Na+K) 43	49	40	65	45
Potassium (K)	--	4.5	5.5	17.0	4.1
Chloride (Cl)	60	62	56	82	50
Sulfate(SO_4)	76	85	99	110	41
Alkalinity ($CaCO_3$)	230	232	192	236	184
Nitrate (N)	2.5	--	--	--	--
Silica(SiO_2)	10.0	5.3	6.0	3.1	8.3
Fluoride (F)	0.7	0.48	0.24	0.55	0.50

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 500
Location: Cache Creek near Walters, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	4/19/61	5/24/61			
Laboratory:	USGS	RATSEC			
Time of collection:	12:30 pm	1:45 pm			
Temperature of stream: °F	68	76			
Discharge (cfs)	52	46			
Spec. cond. micromhos @ 25° C (field)	--	680			
Spec. cond. micromhos @ 25° C (lab.)	742	707			
pH	7.9	7.4			
Turbidity, Jackson units	--	138			
Dissolved solids*	445	445			
Boron (B)	0.38	0.18			
Calcium (Ca)	69	72			
Magnesium (Mg)	23	17			
Total Hardness ($CaCO_3$)	268	250			
Sodium (Na)	57	47			
Potassium (K)	--	6.4			
Chloride (Cl)	62	56			
Sulfate(SO_4)	51	75			
Alkalinity ($CaCO_3$)	241	200			
Nitrate (N)	2.3	--			
Silica(SiO_2)	5.2	11.8			
Fluoride (F)	0.5	0.66			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 497
Location: Red River near Burkburnett, Texas
Basin: Red River
Tributary to: --

Date collected:	10/26/59	12/9/59	12/30/59	2/17/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	2:00 pm	2:25 pm
Temperature of stream: °F	--	--	--	42	--
Discharge (cfs)	--	--	1,210	962	--
Spec. cond. micromhos @ 25° C (field)	--	--	--	5,000	--
Spec. cond. micromhos @ 25° C (lab.)	6,260	7,500	7,400	5,100	5,720
pH	7.5	7.6	7.3	7.7	7.7
Turbidity, Jackson units	--	< 25	400	330	--
Dissolved solids*	3,970	5,710	5,350	3,500	3,890
Boron (B)	0.38	0.42	0.26	0.21	.38
Calcium (Ca)	316	370	364	288	352
Magnesium (Mg)	90	105	95	148	117
Total Hardness ($CaCO_3$)	1,160	1,350	1,300	110	1,360
Sodium (Na)	994	1,400	600	825	(Na+K) 810
Potassium (K)	--	97	11.0	8.2	--
Chloride (Cl)	1,650	2,100	2,100	750	1,320
Sulfate(SO_4)	827	1,000	1,200	950	997
Alkalinity ($CaCO_3$)	131	155	190	190	217
Nitrate (N)	0.38	--	--	--	.7
Silica(SiO_2)	10	10.0	11.6	12.2	12
Fluoride (F)	0.3	0.8	0.8	0.38	.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 497
Location: Red River near Burkburnett, Texas
Basin: Red River
Tributary to: --

Date collected:	2/29/60	3/23/60	4/25/60	5/19/60	5/25/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	12:30 pm	12:30 pm	9:30 am	11:30 am	4:15 pm
Temperature of stream: ^{o}F	31	58	65	--	--
Discharge (cfs)	500	387	123	248	988
Spec. cond. micromhos @ 25° C (field)	4,200	5,400	6,400	4,000	--
Spec. cond. micromhos @ 25° C (lab.)	4,800	4,800	6,600	4,600	6,100
pH	8.2	7.6	7.7	7.7	7.6
Turbidity, Jackson units	300	144	< 25	--	--
Dissolved solids*	3,200	3,630	4,831	3,190	4,090
Boron (B)	.19	0.27	.20	0.25	.56
Calcium (Ca)	290	320	336	240	320
Magnesium (Mg)	84	243	151	68	85
Total Hardness ($CaCO_3$)	1,050	1,800	1,460	880	1,150
Sodium (Na)	635	750	1,050	785	926
Potassium (K)	7.6	8.9	4.1	9.0	--
Chloride (Cl)	965	1,150	1,650	1,200	1,450
Sulfate(SO_4)	625	950	1,280	525	948
Alkalinity ($CaCO_3$)	210	140	140	120	130
Nitrate (N)	--	--	--	--	.2
Silica(SiO_2)	9.5	9.8	3.8	6.1	12
Fluoride (F)	0.6	0.8	.45	0.26	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 497
Location: Red River near Burkburnett, Texas
Basin: Red River
Tributary to: --

Date collected:	6/15/60	6/22/60	7/11/60	7/18/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	4:00 pm	3:45 pm	10:40 am	11:05 am	11:30 am
Temperature of stream: °F	78	88	--	84	80
Discharge (cfs)	--	571	3,350	1,640	412
Spec. cond. micromhos @ 25° C (field)	4,900	8,000	--	5,700	6,800
Spec. cond. micromhos @ 25° C (lab.)	5,000	8,000	6,120	5,400	6,500
pH	7.8	7.6	7.6	7.6	7.9
Turbidity, Jackson units	3,000	350	--	2,000	230
Dissolved solids*	3,347	5,800	4,040	3,830	4,720
Boron (B)	0.11	0.4	.44	0.31	0.49
Calcium (Ca)	328	450	334	184	384
Magnesium (Mg)	44	73	60	126	122
Total Hardness ($CaCO_3$)	1,000	1,520	1,080	980	1,460
Sodium (Na)	650	1,190	1,000	940	1,060
Potassium (K)	10.4	12.5	--	10.0	11.5
Chloride (Cl)	1,090	2,060	1,500	1,580	1,760
Sulfate(SO_4)	762	1,200	944	700	1,230
Alkalinity ($CaCO_3$)	164	124	153	132	136
Nitrate (N)	--	--	.6	--	--
Silica(SiO_2)	13.0	12.8	18	13.6	12.8
Fluoride (F)	0.36	1.2	.7	0.7	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No. 497
Location: Red River near Burkburnett, Texas
Basin: Red River
Tributary to: --

Date collected:	9/14/60	10/10/60	10/17/60	11/14/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	12:00 am	11:15 am	11:45 am	11:00 am	11:50 am
Temperature of stream: °F	74	--	63	61	74
Discharge (cfs)	205	98	15,000	1,380	1,130
Spec. cond. micromhos @ 25° C (field)	8,300	7,000	3,600	6,900	4,580
Spec. cond. micromhos @ 25° C (lab.)	7,525	6,750	3,690	6,600	4,880
pH	7.9	7.5	7.3	7.5	7.4
Turbidity, Jackson units	3,400	--	5,000	87	--
Dissolved solids*	5,330	4,460	2,335	4,425	3,087
Boron (B)	0.55	.68	0.24	0.78	.37
Calcium (Ca)	408	336	232	368	264
Magnesium (Mg)	110	81	44	112	63
Total Hardness ($CaCO_3$)	1,480	1,170	760	1,380	920
Sodium (Na)	1,313	1,130	900	875	738
Potassium (K)	6.6	--	9.6	9.5	6.5
Chloride (Cl)	2,160	1,800	800	1,675	1,150
Sulfate(SO_4)	1,225	941	588	1,125	725
Alkalinity ($CaCO_3$)	132	98	160	184	148
Nitrate (N)	--	.1	--	--	--
Silica(SiO_2)	10.6	8.8	13.2	12.0	8.8
Fluoride (F)	0.3	.4	0.6	0.5	.43

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 497
Location: Red River near Burkburnett, Texas
Basin: Red River
Tributary to: --

Date collected:	1/16/61	1/23/61	2/13/61	3/13/61	4/12/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	11:00 am	10:35 am	10:55 am	10:30 am	2:40 pm
Temperature of stream: °F	73.5	72	78	55	7.7
Discharge (cfs)	557	584	888	429	783
Spec. cond. micromhos @ 25° C (field)	--	7,590	8,118	7,500	--
Spec. cond. micromhos @ 25° C (lab.)	9,340	7,030	7,860	9,300	6,912
pH	7.6	7.4	7.55	7.5	--
Turbidity, Jackson units	--	--	> 25	--	150
Dissolved solids*	6,290	4,817	5,513	6,143	4,760
Boron (B)	.63	.39	.52	.525	.44
Calcium (Ca)	464	368	392	432	420
Magnesium (Mg)	130	126	117	126	158
Total Hardness ($CaCO_3$)	1,690	1,440	1,460	1,600	1,700
Sodium (Na)	1,560	1,250	1,250	1,250	912
Potassium (K)	--	7.5	10.3	10.0	8.6
Chloride (Cl)	2,500	1,875	2,075	2,350	1,650
Sulfate(SO_4)	1,310	1,125	1,200	1,425	1,200
Alkalinity ($CaCO_3$)	195	176	164	128	144
Nitrate (N)	.2	--	--	--	--
Silica(SiO_2)	14	8.9	6.8	6.6	8.8
Fluoride (F)	.5	.59	.59	.50	.65

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 497
Location: Red River near Burkburnett, Texas
Basin: Red River
Tributary to: --

Date collected:	4/19/61	5/24/61			
Laboratory:	USGS	RATSEC			
Time of collection:	1:15 pm	2:30 pm			
Temperature of stream: °F	77	74			
Discharge (cfs)	450	700			
Spec. cond. micromhos @ 25° C (field)	--	5,900			
Spec. cond. micromhos @ 25° C (lab.)	6,980	6,300			
pH	7.2	7.45			
Turbidity, Jackson units	--	650			
Dissolved solids*	4,760	4,036			
Boron (B)	1.2	.26			
Calcium (Ca)	368	360			
Magnesium (Mg)	127	97			
Total Hardness ($CaCO_3$)	1,440	1,300			
Sodium (Na)	1,090	925			
Potassium (K)	--	10.2			
Chloride (Cl)	1,700	1,425			
Sulfate(SO_4)	1,230	925			
Alkalinity ($CaCO_3$)	128	140			
Nitrate (N)	.0	--			
Silica(SiO_2)	11	11.0			
Fluoride (F)	.4	.71			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 759
Location: Pease River near Vernon, Texas
Basin: Red River
Tributary to: Red River

Date collected:	10/27/59	12/10/59	12/28/59	2/15/60	2/25/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	9:15 am	2:15 pm
Temperature of stream: $^{\circ}$F	--	--	--	36	--
Discharge (cfs)	--	5	61	53	35
Spec. cond. micromhos @ 25° C (field)	--	--	--	14,500	--
Spec. cond. micromhos @ 25° C (lab.)	9,210	8,500	12,000	13,600	12,000
pH	7.4	7.5	7.7	7.6	7.9
Turbidity, Jackson units	--	< 25	200	45	--
Dissolved solids*	6,160	6,450	8,900	9,770	8,210
Boron (B)	1.1	0.52	0.59	0.42	.61
Calcium (Ca)	576	545	620	625	633
Magnesium (Mg)	93	107	113	150	192
Total Hardness ($CaCO_3$)	1,820	1,800	2,020	2,180	2,370
Sodium (Na)	1,500	1,600	740	2,700	(Na+K) 1,980
Potassium (K)	--	9	12.3	12.3	--
Chloride (Cl)	2,400	2,330	3,600	3,750	3,290
Sulfate(SO_4)	1,490	1,440	1,900	2,000	1,770
Alkalinity ($CaCO_3$)	144	180	130	150	196
Nitrate (N)	0.38	--	--	--	.2
Silica(SiO_2)	10	12.8	12.2	12.6	13
Fluoride (F)	0.5	1.0	0.9	0.46	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 759
Location: Pease River near Vernon, Texas
Basin: Red River
Tributary to: Red River

Date collected:	3/2/60	3/23/60	4/27/60	5/18/60	5/25/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	12:25 pm	10:10 am	9:15 am	12:45 pm	1:45 pm
Temperature of stream: °F	34	50	65	--	--
Discharge (cfs)	33	10	2	10	128
Spec. cond. micromhos @ 25° C (field)	13,100	14,300	11,000	9,100	--
Spec. cond. micromhos @ 25° C (lab.)	13,500	13,000	9,600	9,000	6,070
pH	7.9	7.6	7.7	7.7	7.5
Turbidity, Jackson units	55	< 25	< 25	--	--
Dissolved solids*	9,600	9,820	7,135	6,570	4,160
Boron (B)	.45	0.49	.2	0.30	.50
Calcium (Ca)	700	996	536	536	388
Magnesium (Mg)	126	160	151	117	61
Total Hardness ($CaCO_3$)	2,300	2,400	1,960	1,820	1,220
Sodium (Na)	2,750	2,500	1,550	1,450	950
Potassium (K)	11.2	14.0	10.5	10.4	--
Chloride (Cl)	3,400	3,800	2,450	2,300	1,500
Sulfate(SO_4)	2,050	1,800	1,800	1,500	1,050
Alkalinity ($CaCO_3$)	160	170	190	150	75
Nitrate (N)	--	--	--	--	.3
Silica(SiO_2)	9.8	9.6	12.2	12.0	12
Fluoride (F)	0.9	0.8	.8	0.40	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.:	759
Location:	Pease River near Vernon, Texas
Basin:	Red River
Tributary to:	Red River

Date collected:	6/15/60	6/22/60	7/13/60	7/21/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	3:40 pm	6:10 pm	2:30 pm	9:00 am	4:15 pm
Temperature of stream: °F	88	83	--	76	86
Discharge (cfs)	392	37	116	660	--
Spec. cond. micromhos @ 25° C (field)	3,750	13,000	--	9,200	1,850
Spec. cond. micromhos @ 25° C (lab.)	3,400	11,800	4,820	7,600	1,750
pH	7.9	7.5	7.6	7.7	8.0
Turbidity, Jackson units	3,000	54	--	850	> 5,000
Dissolved solids*	2,472	8,930	3,110	5,900	1,310
Boron (B)	0.09	0.6	.37	0.52	0.49
Calcium (Ca)	272	640	268	460	172
Magnesium (Mg)	36	146	51	85	34
Total Hardness ($CaCO_3$)	830	2,200	880	1,500	570
Sodium (Na)	475	2,150	761	1,500	215
Potassium (K)	8.2	13.5	--	20.2	5.7
Chloride (Cl)	730	3,450	1,180	2,500	290
Sulfate(SO_4)	550	1,475	728	1,125	425
Alkalinity ($CaCO_3$)	156	108	108	100	152
Nitrate (N)	--	--	.25	--	--
Silica(SiO_2)	13.0	13.0	14	12.3	7.4
Fluoride (F)	0.10	0.8	.9	0.4	0.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 759
Location: Pease River near Vernon, Texas
Basin: Red River
Tributary to: Red River

Date collected:	10/11/60	10/18/60	11/16/60	12/14/60	1/18/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	3:15 pm	3:50 pm	12:45 pm	11:10 am	9:30 am
Temperature of stream: °F	--	64	58	73	80
Discharge (cfs)	8	21,500	34	65	41
Spec. cond. micromhos @ 25° C (field)	8,000	2,100	12,000	12,300	--
Spec. cond. micromhos @ 25° C (lab.)	7,820	2,275	11,400	11,270	15,000
pH	7.5	7.4	7.5	7.5	7.6
Turbidity, Jackson units	--	5,000	< 25	--	--
Dissolved solids*	5,490	1,490	8,035	7,901	10,400
Boron (B)	1.1	0.20	0.64	.85	1.1
Calcium (Ca)	484	208	640	600	707
Magnesium (Mg)	76	29	134	109	162
Total Hardness ($CaCO_3$)	1,520	640	2,150	1,950	2,430
Sodium (Na)	1,290	345	2,125	1,875	2,780
Potassium (K)	--	6.2	11.2	10	--
Chloride (Cl)	2,050	390	3,300	3,300	4,470
Sulfate(SO_4)	1,300	450	3,200	1,850	1,950
Alkalinity ($CaCO_3$)	84	184	128	132	142
Nitrate (N)	--	--	--	--	.0
Silica(SiO_2)	13	11.4	11.9	8.8	16
Fluoride (F)	.5	0.4	0.6	.43	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 759
Location: Pease River near Vernon, Texas
Basin: Red River
Tributary to: Red River

Date collected:	1/25/61	2/15/61	3/15/61	4/12/61	4/19/61
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	10:20 am	1:30 pm	10:10 am	9:55 am	3:05 pm
Temperature of stream: °F	71	77	62	--	86
Discharge (cfs)	20	55	16	36	21
Spec. cond. micromhos @ 25° C (field)	14,756	15,000	14,000	--	--
Spec. cond. micromhos @ 25° C (lab.)	13,600	14,000	13,500	13,250	13,300
pH	7.5	7.6	7.45	7.7	7.7
Turbidity, Jackson units	--	> 25	< 25	77	--
Dissolved solids*	9,525	9,999	9,295	9,149	9,230
Boron (B)	.92	1.0	.91	1.3	1.6
Calcium (Ca)	680	660	680	700	685
Magnesium (Mg)	170	158	170	73	190
Total Hardness ($CaCO_3$)	2,400	2,300	2,400	2,050	2,490
Sodium (Na)	2,450	2,250	2,050	2,000	2,310
Potassium (K)	10.8	15.4	12	13.2	--
Chloride (Cl)	4,100	4,250	3,800	3,400	3,680
Sulfate(SO_4)	1,950	1,950	2,070	2,075	2,090
Alkalinity ($CaCO_3$)	148	140	132	136	147
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.5	7.0	9.0	8.8	13
Fluoride (F)	.87	.49	.60	1.02	.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 759
Location: Pease River near Vernon, Texas
Basin: Red River
Tributary to:

Date collected:	5/24/61				
Laboratory:	RATSEC				
Time of collection:	10:55 am				
Temperature of stream: °F	70				
Discharge (cfs)	6				
Spec. cond. micromhos @ 25° C (field)	16,000				
Spec. cond. micromhos @ 25° C (lab.)	12,400				
pH	7.4				
Turbidity, Jackson units	> 25				
Dissolved solids*	8,854				
Boron (B)	.95				
Calcium (Ca)	760				
Magnesium (Mg)	231				
Total Hardness ($CaCO_3$)	2,850				
Sodium (Na)	1,875				
Potassium (K)	14.3				
Chloride (Cl)	3,300				
Sulfate(SO_4)	2,300				
Alkalinity ($CaCO_3$)	116				
Nitrate (N)	--				
Silica(SiO_2)	8.8				
Fluoride (F)	.71				

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 755
Location: Pease River near Quanah, Texas
Basin: Red River
Tributary to: Red River

Date collected:	10/29/59	12/10/59	12/30/59	2/16/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	1:50 pm	5:15 pm
Temperature of stream: °F	55	--	--	47	45
Discharge (cfs)	--	--	17	8.5	5.5
Spec. cond. micromhos @ 25° C (field)	--	--	--	26,000	--
Spec. cond. micromhos @ 25° C (lab.)	31,600	30,000	25,000	25,000	32,400
pH	7.7	7.7	7.6	7.5	7.8
Turbidity, Jackson units	--	< 25	< 25	< 25	--
Dissolved solids*	22,100	23,600	19,550	21,100	22,700
Boron (B)	1.8	0.34	0.04	0.42	1.1
Calcium (Ca)	1,150	1,320	918	950	1,130
Magnesium (Mg)	200	105	206	233	251
Total Hardness ($CaCO_3$)	3,690	3,730	3,120	3,350	3,850
Sodium (Na)	6,810	7,200	2,900	6,500	(Na+K) 6,820
Potassium (K)	--	230	20.0	29.0	--
Chloride (Cl)	10,800	11,600	10,000	9,200	10,900
Sulfate(SO_4)	3,010	1,500	3,000	3,100	3,050
Alkalinity ($CaCO_3$)	127	130	140	130	129
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.0	8.8	12.2	12.0	14
Fluoride (F)	0.6	1.8	0.9	0.78	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.
* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 755
Location: Pease River near Quanah, Texas
Basin: Red River
Tributary to: Red River

Date collected:	3/2/60	3/21/60	4/25/60	5/16/60	5/23/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	10:15 am	5:30 pm	4:00 pm	4:55 pm	4:55 pm
Temperature of stream: °F	33	65	81	--	--
Discharge (cfs)	3.6	5.5	3.6	3.6	167
Spec. cond. micromhos @ 25° C (field)	29,500	35,000	29,000	35,500	--
Spec. cond. micromhos @ 25° C (lab.)	25,000	31,000	31,000	33,000	5,910
pH	8.0	7.6	7.5	7.5	7.4
Turbidity, Jackson units	< 25	< 25	< 25	--	--
Dissolved solids*	20,100	24,100	24,372	25,280	4,010
Boron (B)	.49	0.46	.14	0.40	.48
Calcium (Ca)	840	1,088	1,160	1,240	368
Magnesium (Mg)	260	250	340	267	49
Total Hardness ($CaCO_3$)	3,200	3,740	4,300	4,200	1,120
Sodium (Na)	6,500	7,500	6,750	8,200	923
Potassium (K)	24.0	565.0	3	75.0	--
Chloride (Cl)	8,800	11,300	11,100	11,800	1,450
Sulfate(SO_4)	3,100	2,750	3,050	3,600	964
Alkalinity ($CaCO_3$)	130	100	120	120	75
Nitrate (N)	--	--	--	--	.2
Silica(SiO_2)	10.2	10.8	10.4	11.9	16
Fluoride (F)	0.9	0.6	1.0	1.12	.3

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 755
Location: Pease River near Quanah, Texas
Basin: Red River
Tributary to: Red River

Date collected:	6/13/60	6/20/60	7/11/60	7/20/60	8/15/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	5:00 pm	5:35 pm	4:30 pm	1:30 pm	1:50 pm
Temperature of stream: °F	83	88	--	85	84
Discharge (cfs)	560	32	58	19	1.1
Spec. cond. micromhos @ 25° C (field)	3,450	22,000	--	17,000	25,000
Spec. cond. micromhos @ 25° C (lab.)	3,000	19,000	8,620	14,400	22,000
pH	7.9	7.4	7.6	7.7	7.8
Turbidity, Jackson units	3,000	25	--	200	25
Dissolved solids*	2,290	14,835	5,590	10,500	16,850
Boron (B)	0.09	1.0	.57	0.72	1.00
Calcium (Ca)	212	780	366	660	1,000
Magnesium (Mg)	61	206	75	97	231
Total Hardness ($CaCO_3$)	780	2,800	1,220	2,050	3,450
Sodium (Na)	425	3,925	1,520	3,000	5,000
Potassium (K)	8.0	18.1	--	10.7	16.8
Chloride (Cl)	570	6,600	2,400	5,000	8,200
Sulfate(SO_4)	588	1,900	989	1,525	2,800
Alkalinity ($CaCO_3$)	144	108	116	104	128
Nitrate (N)	--	--	.2	--	--
Silica(SiO_2)	13.6	14.1	16	12.0	12.0
Fluoride (F)	0.16	1.3	.9	0.5	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 755
Location: Pease River near Quanah, Texas
Basin: Red River
Tributary to: Red River

Date collected:	9/12/60	10/10/60	10/17/60	11/14/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	3:30 pm	2:50 pm	4:00 pm	4:15 pm	4:30 pm
Temperature of stream: °F	88	--	63	71	71
Discharge (cfs)	2.3	3.0	2,080	7.9	23
Spec. cond. micromhos @ 25° C (field)	30,000	32,000	3,750	27,500	21,000
Spec. cond. micromhos @ 25° C (lab.)	26,500	30,400	3,950	26,500	18,910
pH	7.8	7.8	7.2	7.4	7.4
Turbidity, Jackson units	< 25	--	5,000	< 25	--
Dissolved solids*	20,265	22,300	2,460	18,635	13,555
Boron (B)	1.52	2.6	0.24	1.04	.82
Calcium (Ca)	1,100	1,120	288	940	740
Magnesium (Mg)	255	232	14	207	158
Total Hardness ($CaCO_3$)	3,800	3,750	780	3,200	2,500
Sodium (Na)	5,400	6,700	538	5,250	3,750
Potassium (K)	16.5	--	13.1	19.4	14
Chloride (Cl)	9,950	10,700	900	8,900	6,550
Sulfate(SO_4)	2,950	2,990	513	4,750	2,000
Alkalinity ($CaCO_3$)	100	105	104	120	116
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	13.1	5.1	10.7	11.0	10.4
Fluoride (F)	TR	.4	0.4	0.8	.54

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 755
Location: Pease River near Quanah, Texas
Basin: Red River
Tributary to: Red River

Date collected:	1/16/61	1/23/61	2/13/61	3/13/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	2:35 pm	2:25 pm	2:30 pm	2:55 pm	2:15 pm
Temperature of stream: °F	81.5	71	75.5	74	7.7
Discharge (cfs)	22	9	13	5	7
Spec. cond. micromhos @ 25° C (field)	--	29,078	21,500	30,000	--
Spec. cond. micromhos @ 25° C (lab.)	22,100	26,000	20,000	27,200	25,920
pH	7.6	7.5	7.45	7.5	--
Turbidity, Jackson units	--	--	> 25	< 25	> 25
Dissolved solids*	15,300	19,163	14,456	19,441	20,020
Boron (B)	1.2	1.16	.94	1.13	1.1
Calcium (Ca)	792	960	760	980	1,040
Magnesium (Mg)	193	194	170	194	219
Total Hardness ($CaCO_3$)	2,770	3,200	2,600	3,250	3,500
Sodium (Na)	4,510	5,950	3,938	5,125	4,812
Potassium (K)	--	15.5	17.5	17.8	22.0
Chloride (Cl)	7,180	8,800	6,750	9,250	9,350
Sulfate(SO_4)	2,240	2,550	2,250	2,950	2,700
Alkalinity ($CaCO_3$)	123	128	116	108	124
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	18	9.5	7.6	9.5	9.2
Fluoride (F)	.6	1.03	.54	.60	.65

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 755
Location: Pease River near Quanah, Texas
Basin: Red River
Tributary to:

Date collected:	4/17/61	5/22/61			
Laboratory:	USGS	RATSEC			
Time of collection:	5:05 pm	2:55 pm			
Temperature of stream: °F	78	90			
Discharge (cfs)	4	2			
Spec. cond. micromhos @ 25° C (field)	--	30,500			
Spec. cond. micromhos @ 25° C (lab.)	30,300	28,500			
pH	7.6	7.3			
Turbidity, Jackson units	--	> 25			
Dissolved solids*	21,800	21,564			
Boron (B)	1.9	1.20			
Calcium (Ca)	1,070	1,120			
Magnesium (Mg)	238	255			
Total Hardness ($CaCO_3$)	3,650	3,850			
Sodium (Na)	6,390	5,875			
Potassium (K)	--	21.3			
Chloride (Cl)	10,100	10,000			
Sulfate(SO_4)	3,050	2,950			
Alkalinity ($CaCO_3$)	116	96			
Nitrate (N)	--	--			
Silica(SiO_2)	13	10.3			
Fluoride (F)	.4	.76			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 490
Location: North Fork of Red River near Headrick, Oklahoma
Basin: Red River Basin
Tributary to: Red River

Date collected:	10/27/59	12/28/59	2/15/60	2/25/60	3/1/60
Laboratory:	USGS	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	--	--	10:30 am	12:55 pm	9:30 am
Temperature of stream: °F	--	--	37	--	31
Discharge (cfs)	35	354	455	800	150
Spec. cond. micromhos @ 25° C (field)	--	--	4,100	--	7,300
Spec. cond. micromhos @ 25° C (lab.)	7,620	6,000	3,900	3,320	7,500
pH	7.6	7.9	7.6	7.9	8.1
Turbidity, Jackson units	--	110	95	--	120
Dissolved solids*	4,840	3,830	2,790	2,240	4,968
Boron (B)	0.55	0.32	0.17	.35	.26
Calcium (Ca)	320	284	280	232	350
Magnesium (Mg)	88	95	75	78	112
Total Hardness ($CaCO_3$)	1,160	1,100	980	900	1,340
Sodium (Na)	1,340	870	540	(Na+K) 404	1,050
Potassium (K)	--	8.8	6.3	--	8.4
Chloride (Cl)	2,150	1,420	700	630	1,650
Sulfate(SO_4)	84	850	800	675	1,280
Alkalinity ($CaCO_3$)	190	220	210	180	200
Nitrate (N)	0.43	--	--	1.1	--
Silica(SiO_2)	2.5	12.2	12.0	12	10.4
Fluoride (F)	0.1	0.7	0.40	.7	0.8

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 490
Location: North Fork of Red River near Headrick, Oklahoma
Basin: Red River Basin
Tributary to: Red River

Date collected:	3/23/60	4/27/60	5/18/60	5/25/60	6/15/60
Laboratory:	RATSEC	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	8:40 am	8:15 am	10:25 am	11:15 am	1:40 pm
Temperature of stream: °F	45	63	72	--	83
Discharge (cfs)	288	143	103	129	2,030
Spec. cond. micromhos @ 25° C (field)	4,000	8,500	9,400	--	2,590
Spec. cond. micromhos @ 25° C (lab.)	4,000	9,000	8,600	8,280	2,300
pH	7.7	7.6	7.5	7.4	8.0
Turbidity, Jackson units	118	< 25	--	--	160
Dissolved solids*	2,990	6,096	6,053	5,630	1,710
Boron (B)	0.20	.28	0.20	.59	0.10
Calcium (Ca)	240	356	340	384	188
Magnesium (Mg)	80	122	124	98	66
Total Hardness ($CaCO_3$)	930	1,390	1,360	1,360	740
Sodium (Na)	635	1,550	1,280	1,410	250
Potassium (K)	5.7	10.0	11.5	--	6.8
Chloride (Cl)	940	2,450	2,520	2,250	340
Sulfate(SO_4)	600	1,200	1,150	1,050	512
Alkalinity ($CaCO_3$)	200	200	160	164	156
Nitrate (N)	--	--	--	.5	--
Silica(SiO_2)	10.2	5.0	5.8	7.4	9.2
Fluoride (F)	0.8	.49	0.15	.5	0.18

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 490
Location: North Fork of Red River near Headrick, Oklahoma
Basin: Red River Basin
Tributary to: Red River

Date collected:	6/22/60	7/13/60	7/20/60	8/16/60	9/14/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	2:35 pm	10:00 am	9:15 am	3:30 pm	9:50 am
Temperature of stream: °F	85	--	78	76	71
Discharge (cfs)	57	109	46	21	63
Spec. cond. micromhos @ 25° C (field)	7,500	--	5,900	5,150	10,000
Spec. cond. micromhos @ 25° C (lab.)	6,400	10,700	5,400	--	9,050
pH	7.2	7.6	7.7	--	7.6
Turbidity, Jackson units	< 25	--	192	< 25	260
Dissolved solids*	4,500	7,110	3,800	3,180	6,385
Boron (B)	0.1	.46	0.30	0.33	0.44
Calcium (Ca)	320	439	350	200	440
Magnesium (Mg)	121	98	73	83	102
Total Hardness ($CaCO_3$)	1,300	1,500	1,180	840	1,520
Sodium (Na)	980	1,960	965	795	1,650
Potassium (K)	9.9	--	10.0	8.0	12.8
Chloride (Cl)	1,770	3,090	1,550	1,250	2,800
Sulfate(SO_4)	700	1,230	975	700	1,300
Alkalinity ($CaCO_3$)	128	128	116	584	132
Nitrate (N)	--	.4	--	--	--
Silica(SiO_2)	8.5	10	10.6	5.3	10.0
Fluoride (F)	0.4	.5	0.3	0.3	0.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 490
Location: North Fork of Red River near Headrick, Oklahoma
Basin: Red River Basin
Tributary to: Red River

Date collected:	10/11/60	10/18/60	11/16/60	12/14/60	1/17/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	2:10 pm	2:45 pm	11:15 am	8:35 am	2:05 pm
Temperature of stream: °F	--	61	52	71	80.5
Discharge (cfs)	14	14,900	162	563	418
Spec. cond. micromhos @ 25° C (field)	12,000	1,060	7,000	4,390	--
Spec. cond. micromhos @ 25° C (lab.)	11,700	1,200	6,970	4,185	3,930
pH	7.8	7.6	7.3	7.3	7.5
Turbidity, Jackson units	--	5,000	< 25	--	--
Dissolved solids*	7,820	675	4,610	2,746	2,650
Boron (B)	.86	0.14	0.40	.24	.21
Calcium (Ca)	419	88	392	248	234
Magnesium (Mg)	123	14	102	73	82
Total Hardness ($CaCO_3$)	1,550	280	1,400	920	920
Sodium (Na)	2,190	119	1,020	538	(Na+K) 544
Potassium (K)	--	5.0	9.5	6.8	--
Chloride (Cl)	3,540	225	1,700	825	830
Sulfate(SO_4)	1,150	145	1,000	825	735
Alkalinity ($CaCO_3$)	121	112	224	156	164
Nitrate (N)	.1	--	--	--	.4
Silica(SiO_2)	4.8	8.8	12.0	8.8	8.8
Fluoride (F)	.2	0.3	0.5	.43	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 490
Location: North Fork of Red River near Headrick, Oklahoma
Basin: Red River
Tributary to:

Date collected:	1/24/61	2/15/61	3/15/61	4/12/61	4/19/61
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	4:00 pm	9:30 am	9:00 am	8:45 am	1:45 pm
Temperature of stream: °F	72	76.5	56	--	77
Discharge (cfs)	258	591	108	336	115
Spec. cond. micromhos @ 25° C (field)	5,547	3,050	8,300	--	--
Spec. cond. micromhos @ 25° C (lab.)	5,350	3,080	8,000	3,168	6,800
pH	7.4	7.5	7.15	7.4	7.4
Turbidity, Jackson units	--	725	< 25	< 5,000	--
Dissolved solids*	3,548	2,079	5,470	2,316	4,570
Boron (B)	.28	.22	.12	.225	.54
Calcium (Ca)	288	208	368	272	352
Magnesium (Mg)	92	78	117	78	112
Total Hardness ($CaCO_3$)	1,100	840	1,400	1,000	1,340
Sodium (Na)	725	300	1,300	340	1,100
Potassium (K)	7.9	7.2	35	6.2	--
Chloride (Cl)	1,325	550	2,250	600	1,700
Sulfate(SO_4)	875	619	1,475	775	1,110
Alkalinity ($CaCO_3$)	196	152	156	180	174
Nitrate (N)	--	--	--	--	.4
Silica(SiO_2)	8.4	7.2	4.8	9.9	7.2
Fluoride (F)	.59	.49	.50	.60	.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 490
Location: North Fork of Red River near Headrick, Oklahoma
Basin: Red River Basin
Tributary to: Red River

Date collected:	5/24/61				
Laboratory:	RATSEC				
Time of collection:	8:30 am				
Temperature of stream: °F	77				
Discharge (cfs)	180				
Spec. cond. micromhos @ 25° C (field)	4,460				
Spec. cond. micromhos @ 25° C (lab.)	4,400				
pH	7.5				
Turbidity, Jackson units	53				
Dissolved solids*	2,958				
Boron (B)	.48				
Calcium (Ca)	264				
Magnesium (Mg)	87				
Total Hardness ($CaCO_3$)	1,020				
Sodium (Na)	540				
Potassium (K)	8.7				
Chloride (Cl)	1,050				
Sulfate(SO_4)	850				
Alkalinity ($CaCO_3$)	132				
Nitrate (N)	--				
Silica(SiO_2)	8.4				
Fluoride (F)	.66				

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 753
Location: Elm Fork near Carl, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	10/28/59	12/8/59	12/28/59	2/15/60	2/24/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	12:15 pm	2:20 pm
Temperature of stream: °F	52	--	--	50	--
Discharge (cfs)	9.4	13.0	34	42	48
Spec. cond. micromhos @ 25° C (field)	--	--	--	10,500	--
Spec. cond. micromhos @ 25° C (lab.)	43,000	26,000	15,500	10,000	18,600
pH	7.5	7.7	7.5	7.6	7.8
Turbidity, Jackson units	--	< 25	< 25	46	--
Dissolved solids*	28,800	18,600	11,370	7,280	12,500
Boron (B)	1.1	0.36	0.05	0.31	.36
Calcium (Ca)	761	785	580	560	664
Magnesium (Mg)	253	130	157	165	205
Total Hardness ($CaCO_3$)	2,940	2,500	2,100	2,080	2,500
Sodium (Na)	9,900	7,000	2,850	1,800	(Na+K) 3,600
Potassium (K)	--	230	14.6	10	--
Chloride (Cl)	15,800	9,450	5,000	2,550	5,860
Sulfate(SO_4)	2,020	1,500	1,900	1,730	1,840
Alkalinity ($CaCO_3$)	90	150	140	140	150
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	6.5	16.8	11.8	12.0	13
Fluoride (F)	0.1	1.3	0.8	0.46	.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 753
Location: Elm Fork near Carl, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	2/29/60	3/22/60	4/26/60	5/17/60	5/24/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	11:50 am	1:00 pm	1:25 pm	12:35 pm	12:55 pm
Temperature of stream: °F	35	65	77	80	--
Discharge (cfs)	--	28	21	17	28
Spec. cond. micromhos @ 25° C (field)	17,000	15,500	17,000	25,000	--
Spec. cond. micromhos @ 25° C (lab.)	16,000	13,400	22,500	23,000	25,900
pH	7.7	8.0	7.5	7.6	7.4
Turbidity, Jackson units	< 25	< 25	< 25	--	--
Dissolved solids*	11,700	10,200	15,460	17,089	17,500
Boron (B)	.27	0.27	.15	0.32	.70
Calcium (Ca)	632	608	680	712	743
Magnesium (Mg)	270	185	102	219	194
Total Hardness ($CaCO_3$)	1,500	2,360	2,120	2,680	2,650
Sodium (Na)	3,100	2,625	4,750	4,800	5,480
Potassium (K)	15.5	7.6	18.1	14.0	--
Chloride (Cl)	5,050	4,100	7,300	8,200	8,790
Sulfate(SO_4)	1,900	1,900	2,130	1,650	1,990
Alkalinity ($CaCO_3$)	150	110	110	100	88
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	11.2	9.4	7.0	10.0	12
Fluoride (F)	0.8	0.8	.54	0.28	.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 753
Location: Elm Fork near Carl, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	6/14/60	6/21/60	7/12/60	7/19/60	8/16/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	1:35 pm	2:00 pm	1:30 pm	1:05 pm	9:30 am
Temperature of stream: °F	90	98	--	85	73
Discharge (cfs)	20	14	19	32	14
Spec. cond. micromhos @ 25° C (field)	21,500	35,000	--	20,000	70,000
Spec. cond. micromhos @ 25° C (lab.)	21,000	34,000	23,500	19,000	--
pH	7.9	7.4	7.5	7.7	--
Turbidity, Jackson units	< 25	< 25	--	31	< 25
Dissolved solids*	13,923	23,620	16,200	12,150	--
Boron (B)	0.05	0.2	.66	0.50	0.82
Calcium (Ca)	672	800	690	660	--
Magnesium (Mg)	175	255	184	97	--
Total Hardness ($CaCO_3$)	2,400	3,050	2,480	2,050	--
Sodium (Na)	3,800	8,350	5,040	4,250	--
Potassium (K)	19.2	2.5	--	9.2	--
Chloride (Cl)	6,300	11,950	8,050	6,200	25,600
Sulfate(SO_4)	1,650	1,750	1,940	1,700	2,500
Alkalinity ($CaCO_3$)	96	76	73	92	--
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	11.4	11.0	12	13.2	8.4
Fluoride (F)	0.74	0.9	.3	0.6	--

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 753
Location: Elm Fork near Carl, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	9/13/60	10/11/60	10/18/60	11/15/60	12/13/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	1:45 pm	9:50 am	11:40 am	3:25 pm	1:15 pm
Temperature of stream: °F	89	--	59	56	72
Discharge (cfs)	15	14	2,330	70	54
Spec. cond. micromhos @ 25° C (field)	22,000	28,000	2,500	12,500	12,000
Spec. cond. micromhos @ 25° C (lab.)	19,100	26,400	2,500	11,440	13,310
pH	7.5	7.6	7.6	7.5	7.3
Turbidity, Jackson units	25	--	> 5,000	< 25	--
Dissolved solids*	13,860	18,500	1,915	8,175	7,666
Boron (B)	0.52	.96	0.17	0.38	.35
Calcium (Ca)	400	711	328	660	580
Magnesium (Mg)	352	174	32	109	170
Total Hardness ($CaCO_3$)	2,450	2,490	950	2,100	2,150
Sodium (Na)	4,250	5,800	263	1,800	2,213
Potassium (K)	17.5	--	7.0	11.2	10.9
Chloride (Cl)	7,150	9,240	370	3,400	3,100
Sulfate(SO_4)	1,825	1,910	825	1,700	1,500
Alkalinity ($CaCO_3$)	88	111	116	108	144
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	11.0	14	9.1	11.4	11.4
Fluoride (F)	0.7	.3	0.4	0.4	.54

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.
* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
**Specific Gravity adjustment made when Conductance exceeds 10,000.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 753
Location: Elm Fork near Carl, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	1/17/61	1/24/61	2/14/61	3/14/61	4/11/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:15 am	11:40 am	12:50 pm	12:35 pm	11:30 am
Temperature of stream: °F	80.5	71	75.5	62	--
Discharge (cfs)	37	38	28	28	54
Spec. cond. micromhos @ 25° C (field)	--	13,671	14,600	17,000	--
Spec. cond. micromhos @ 25° C (lab.)	13,800**	13,000	14,000	15,600	10,460
pH	7.6	7.4	7.2	7.3	7.3
Turbidity, Jackson units	--	--	725	< 25	> 25
Dissolved solids*	9,360	8,534	9,764	10,724	7,760
Boron (B)	.41	.36	.4	.36	.36
Calcium (Ca)	596	640	600	600	619
Magnesium (Mg)	152	158	134	146	110
Total Hardness ($CaCO_3$)	2,110	2,250	2,050	2,100	2,000
Sodium (Na)	(Na+K) 2,580	2,150	2,150	2,700	1,500
Potassium (K)	--	11.5	11.5	50	9.1
Chloride (Cl)	4,100	3,900	4,250	4,950	3,000
Sulfate(SO_4)	1,740	1,525	1,650	1,500	1,775
Alkalinity ($CaCO_3$)	129	124	132	108	112
Nitrate (N)	1.0	--	--	--	--
Silica(SiO_2)	15	10.0	7.4	8.3	8.3
Fluoride (F)	.3	.65	.49	.45	.50

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 753
Location: Elm Fork near Carl, Oklahoma
Basin: Red River
Tributary to: North Fork of Red River

Date collected:	4/18/61	5/23/61			
Laboratory:	USGS	RATSEC			
Time of collection:	3:25 pm	12:20 pm			
Temperature of stream: °F	77	76			
Discharge (cfs)	49	23			
Spec. cond. micromhos @ 25° C (field)	--	19,000			
Spec. cond. micromhos @ 25° C (lab.)	11,400	17,700			
pH	7.8	7.15			
Turbidity, Jackson units	--	< 25			
Dissolved solids*	8,020	12,079			
Boron (B)	.90	.48			
Calcium (Ca)	609	680			
Magnesium (Mg)	151	194			
Total Hardness ($CaCO_3$)	2,140	2,500			
Sodium (Na)	1,940	3,000			
Potassium (K)	--	14.7			
Chloride (Cl)	3,080	5,450			
Sulfate(SO_4)	1,630	1,950			
Alkalinity ($CaCO_3$)	320	100			
Nitrate (N)	.9	--			
Silica(SiO_2)	9.4	10.3			
Fluoride (F)	.7	.76			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 754
Location: Elm Fork at Salton Crossing, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	10/28/59	12/8/59	12/28/59	2/15/60	2/24/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	2:30 pm	2:45 pm
Temperature of stream: °F	56	--	--	50	--
Discharge (cfs)	--	24.4	24.4	61.4	27.3
Spec. cond. micromhos @ 25° C (field)	--	--	--	4,450	--
Spec. cond. micromhos @ 25° C (lab.)	11,200	8,000	5,500	4,200	6,180
pH	7.8	7.7	7.8	7.4	7.9
Turbidity, Jackson units	--	< 25	25	< 25	--
Dissolved solids*	7,600	6,350	4,451	3,550	4,730
Boron (B)	0.58	0.14	0.40	0.20	.27
Calcium (Ca)	685	785	560	525	640
Magnesium (Mg)	117	10	109	115	142
Total Hardness ($CaCO_3$)	2,190	2,000	1,850	1,800	2,180
Sodium (Na)	1,870	1,400	700	365	(Na+K) 698
Potassium (K)	--	9	7.6	5.7	--
Chloride (Cl)	2,970	1,950	1,120	550	1,200
Sulfate(SO_4)	1,880	1,500	1,800	1,730	1,780
Alkalinity ($CaCO_3$)	100	120	130	140	146
Nitrate (N)	1.1	--	--	--	1.3
Silica(SiO_2)	7.5	15.6	12.0	12.0	12
Fluoride (F)	0.4	1.0	0.9	0.42	.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 754
Location: Elm Fork at Salton Crossing, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	3/1/60	3/22/60	4/26/60	5/17/60	5/24/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	1:20 pm	1:55 pm	2:45 pm	1:00 pm	1:20 pm
Temperature of stream: °F	31	65	79	87	--
Discharge (cfs)	--	38.0	23.6	18.30	22.50
Spec. cond. micromhos @ 25° C (field)	--	5,200	4,500	9,400	--
Spec. cond. micromhos @ 25° C (lab.)	5,500	5,400	7,400	8,600	8,070
pH	7.9	7.7	7.4	7.7	7.6
Turbidity, Jackson units	< 25	95	< 25	--	--
Dissolved solids*	4,232	4,630	5,973	6,755	6,170
Boron (B)	.21	0.22	.21	0.25	.56
Calcium (Ca)	560	576	640	700	668
Magnesium (Mg)	130	121	146	194	130
Total Hardness ($CaCO_3$)	1,940	1,940	2,200	2,550	2,200
Sodium (Na)	600	705	990	1,025	1,160
Potassium (K)	6.5	14.5	9.0	11.5	--
Chloride (Cl)	940	1,000	1,650	2,090	1,880
Sulfate(SO_4)	1,800	1,700	2,050	1,900	1,910
Alkalinity ($CaCO_3$)	160	120	120	100	89
Nitrate (N)	--	--	--	--	.6
Silica(SiO_2)	11.0	9.4	7.8	11.4	11
Fluoride (F)	0.8	0.8	.23	0.33	.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 754
Location: Elm Fork at Salton Crossing, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	6/14/60	6/21/60	7/12/60	7/19/60	8/16/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	2:55 pm	3:25 pm	2:00 pm	1:30 pm	11:45 am
Temperature of stream: °F	90	93	--	87	76
Discharge (cfs)	22.8	8.36	13.58	19.10	3.73
Spec. cond. micromhos @ 25° C (field)	8,350	12,500	--	7,800	20,000
Spec. cond. micromhos @ 25° C (lab.)	7,500	11,400	9,200	6,700	--
pH	7.9	7.5	7.6	7.7	--
Turbidity, Jackson units	< 25	45	--	42	< 25
Dissolved solids*	5,887	8,000	6,620	5,450	--
Boron (B)	0.18	0.1	.46	0.36	0.41
Calcium (Ca)	624	700	640	600	--
Magnesium (Mg)	136	170	127	122	--
Total Hardness ($CaCO_3$)	2,120	2,450	2,120	2,000	--
Sodium (Na)	1,025	1,700	1,420	1,190	--
Potassium (K)	10.5	11.2	--	7.5	--
Chloride (Cl)	1,730	3,300	2,250	1,750	6,200
Sulfate(SO_4)	1,700	1,650	1,870	1,650	2,150
Alkalinity ($CaCO_3$)	96	88	82	88	--
Nitrate (N)	--	--	.4	--	--
Silica(SiO_2)	12.3	11.9	13	14.6	7.1
Fluoride (F)	0.60	0.7	.5	0.7	--

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 754
Location: Elm Fork at Salton Crossing, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	9/13/60	10/11/60	10/21/60	11/15/60	12/15/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	2:05 pm	10:20 am	2:00 pm	4:00 pm	11:30 am
Temperature of stream: °F	88	--	66	56	63
Discharge (cfs)	20.32	11.39	162.06	55.17	44
Spec. cond. micromhos @ 25° C (field)	6,800	8,000	3,500	5,000	5,060
Spec. cond. micromhos @ 25° C (lab.)	6,200	7,770	3,350	4,680	4,508
pH	7.7	7.6	7.4	7.6	7.4
Turbidity, Jackson units	< 25	--	37	< 25	--
Dissolved solids*	4,870	5,900	2,950	3,850	3,620
Boron (B)	0.38	.63	0.33	0.35	.32
Calcium (Ca)	632	640	552	608	520
Magnesium (Mg)	83	103	87	92	121
Total Hardness (CaCO$_3$)	1,920	2,020	1,740	1,900	1,800
Sodium (Na)	860	1,170	263	395	425
Potassium (K)	9.0	--	7.0	7.5	6.2
Chloride (Cl)	1,450	1,820	340	700	650
Sulfate(SO$_4$)	1,825	1,820	1,500	1,600	1,600
Alkalinity (CaCO$_3$)	92	92	148	132	112
Nitrate (N)	--	.5	--	--	--
Silica(SiO$_2$)	12.8	14	11.5	11.9	11.4
Fluoride (F)	0.2	.5	0.5	0.4	.43

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 754
Location: Elm Fork at Salton Crossing, Oklahoma
Basin: Red River Basin
Tributary to: North Fork of Red River

Date collected:	1/17/61	1/24/61	2/14/61	3/14/61	4/11/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	10:35 am	12:00 n	1:15 pm	1:00 pm	12:05 pm
Temperature of stream: °F	81	71	75.5	63	--
Discharge (cfs)	36.2	33	--	28	54
Spec. cond. micromhos @ 25° C (field)	--	5,292	5,560	6,000	--
Spec. cond. micromhos @ 25° C (lab.)	5,270	5,100	5,400	6,000	5,100
pH	7.6	7.6	7.45	7.2	7.5
Turbidity, Jackson units	--	--	> 25	< 25	> 25
Dissolved solids*	4,130	3,772	4,227	4,499	4,115
Boron (B)	.39	.36	.33	.325	.33
Calcium (Ca)	576	544	544	576	600
Magnesium (Mg)	115	107	117	117	133
Total Hardness ($CaCO_3$)	1,910	1,800	1,840	1,920	2,050
Sodium (Na)	586	469	538	650	510
Potassium (K)	--	6.5	7.5	24	5.4
Chloride (Cl)	920	900	1,175	1,175	875
Sulfate(SO_4)	1,680	1,650	1,550	1,550	1,775
Alkalinity ($CaCO_3$)	133	80	120	104	104
Nitrate (N)	1.2	--	--	--	--
Silica(SiO_2)	14	10.1	7.4	9.5	10.3
Fluoride (F)	.5	.54	0	.29	.23

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 754
Location: Elm Fork at Salton Crossing, Oklahoma
Basin: Red River
Tributary to: North Fork of Red River

Date collected:	4/18/61	5/23/61			
Laboratory:	USGS	RATSEC			
Time of collection:	4:05 pm	1:10 pm			
Temperature of stream: °F	73	78			
Discharge (cfs)	49	23			
Spec. cond. micromhos @ 25° C (field)	--	7,250			
Spec. cond. micromhos @ 25° C (lab.)	5,560	7,350			
pH	7.3	7.3			
Turbidity, Jackson units	--	< 25			
Dissolved solids*	4,460	5,320			
Boron (B)	.70	.50			
Calcium (Ca)	600	660			
Magnesium (Mg)	122	182			
Total Hardness ($CaCO_3$)	2,000	2,500			
Sodium (Na)	635	850			
Potassium (K)	--	8.8			
Chloride (Cl)	1,060	1,525			
Sulfate(SO_4)	1,770	1,875			
Alkalinity ($CaCO_3$)	126	104			
Nitrate (N)	.0	--			
Silica(SiO_2)	8.8	11.7			
Fluoride (F)	.7	.76			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory

CHEMICAL ANALYSES

PHS Station No.: 483
Location: North Fork of Red River near Carter, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	10/28/59	12/28/59	2/15/60	3/1/60	3/22/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	--	--	1:00 pm	12:00 N	4:35 pm
Temperature of stream: °F	--	--	42	31	61
Discharge (cfs)	12	157	190	150	205
Spec. cond. micromhos @ 25° C (field)	--	--	2,220	3,000	2,500
Spec. cond. micromhos @ 25° C (lab.)	3,490	2,300	2,200	2,800	2,500
pH	7.8	7.7	7.8	8.0	7.7
Turbidity, Jackson units	--	900	480	80	< 25
Dissolved solids*	2,480	1,730	1,670	2,214	1,490
Boron (B)	0.41	0.21	0.11	0.16	0.16
Calcium (Ca)	332	212	190	250	236
Magnesium (Mg)	95	75	105	146	92
Total Hardness ($CaCO_3$)	1,220	840	920	1,130	970
Sodium (Na)	359	215	175	275	275
Potassium (K)	--	5.5	4.6	4.6	7.8
Chloride (Cl)	500	320	240	340	310
Sulfate(SO_4)	1,060	650	680	1,025	825
Alkalinity ($CaCO_3$)	190	210	240	270	220
Nitrate (N)	0.16	--	--	--	--
Silica(SiO_2)	14	17.0	18.5	18.2	16.8
Fluoride (F)	0.5	0.6	0.48	0.8	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 483
Location: North Fork of Red River near Carter, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	4/26/60	5/17/60	5/24/60	6/15/60	6/22/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	5:05 pm	3:50 pm	4:50 pm	9:15 am	11:25 am
Temperature of stream: °F	68	85	--	76	82
Discharge (cfs)	50	25	56	93	17
Spec. cond. micromhos @ 25° C (field)	2,400	2,500	--	1,250	2,800
Spec. cond. micromhos @ 25° C (lab.)	2,600	2,520	2,750	1,160	2,600
pH	7.4	7.7	7.3	7.9	7.7
Turbidity, Jackson units	< 25	--	--	1,500	< 25
Dissolved solids*	2,014	2,129	2,240	965	1,776
Boron (B)	0.14	0.20	0.52	0.07	0.1
Calcium (Ca)	196	204	270	128	260
Magnesium (Mg)	99	153	101	31	97
Total Hardness ($CaCO_3$)	900	1,140	1,090	450	1,050
Sodium (Na)	275	250	252	80	250
Potassium (K)	4.3	5.4	--	5.7	6.2
Chloride (Cl)	380	340	310	130	340
Sulfate(SO_4)	925	1,025	1,030	275	550
Alkalinity ($CaCO_3$)	170	140	126	188	132
Nitrate (N)	--	--	0.2	--	--
Silica(SiO_2)	12.0	13.6	14	15.0	17.2
Fluoride (F)	0.45	0.26	0.7	0.28	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 483
Location: North Fork of Red River near Carter, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	7/12/60	7/19/60	8/16/60	9/13/60	10/11/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	4:00 pm	3:30 pm	1:15 pm	3:55 pm	12:15 pm
Temperature of stream: °F	--	84	80	87	--
Discharge (cfs)	134	180	0.6	42	18
Spec. cond. micromhos @ 25° C (field)	--	2,400	2,400	2,300	2,700
Spec. cond. micromhos @ 25° C (lab.)	2,100	2,100	--	2,250	2,650
pH	7.5	7.7	--	7.7	7.8
Turbidity, Jackson units	--	800	> 5,000	96	--
Dissolved solids*	1,500	1,800	--	1,740	2,080
Boron (B)	0.26	0.33	0.30	0.33	0.53
Calcium (Ca)	204	232	--	216	244
Magnesium (Mg)	56	78	--	92	93
Total Hardness (CaCO$_3$)	740	900	--	920	990
Sodium (Na)	194	243	--	200	261
Potassium (K)	--	9.2	--	8.1	--
Chloride (Cl)	252	290	440	250	305
Sulfate(SO$_4$)	635	725	775	825	947
Alkalinity (CaCO$_3$)	141	160	--	140	139
Nitrate (N)	0.4	--	--	--	0.2
Silica(SiO$_2$)	17	17.6	10.8	15.0	16.0
Fluoride (F)	0.7	0.4	--	0.3	0.4

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 483
Location: North Fork of Red River near Carter, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	10/18/60	11/16/60	12/13/60	1/17/61	1/24/61
Laboratory:	RATSEC	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	12:55 pm	8:10 pm	2:45 pm	12:00 N	1:50 pm
Temperature of stream: °F	59	43	70	80.5	72
Discharge (cfs)	4,960	180	379	204	173
Spec. cond. micromhos @ 25° C (field)	850	2,500	2,730	--	2,774
Spec. cond. micromhos @ 25° C (lab.)	1,030	2,600	2,646	2,630	2,700
pH	7.7	7.7	7.2	7.8	7.4
Turbidity, Jackson units	> 5,000	> 25	--	--	--
Dissolved solids*	650	1,870	1,993	1,990	2,135
Boron (B)	0.12	0.25	0.21	0.28	0.28
Calcium (Ca)	120	216	264	250	256
Magnesium (Mg)	24	97	85	96	136
Total Hardness ($CaCO_3$)	400	940	1,010	1,020	1,200
Sodium (Na)	64	220	245	242	220
Potassium (K)	5.5	5.3	4.9	--	4.4
Chloride (Cl)	105	295	320	305	350
Sulfate(SO_4)	200	550	925	856	900
Alkalinity ($CaCO_3$)	192	328	208	221	224
Nitrate (N)	--	--	--	0.6	--
Silica(SiO_2)	12.0	16.4	8.8	22.0	15.0
Fluoride (F)	0.5	0.2	0.43	1.0	0.98

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 483
Location: North Fork of Red River near Carter, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	2/15/61	3/14/61	4/11/61	4/19/61	5/23/61
Laboratory:	RATSEC	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	11:10 am	4:20 pm	2:25 pm	11:25 am	2:40 pm
Temperature of stream: °F	70.5	68	--	69	78
Discharge (cfs)	107	120	159	107	100
Spec. cond. micromhos @ 25° C (field)	2,650	2,750	--	--	2,000
Spec. cond. micromhos @ 25° C (lab.)	2,570	2,880	2,740	2,480	2,200
pH	7.6	7.2	7.7	7.6	7.45
Turbidity, Jackson units	100	< 25	120	--	62
Dissolved solids*	1,971	2,105	1,975	1,910	1,568
Boron (B)	0.25	0.245	0.19	0.47	0.30
Calcium (Ca)	240	224	232	208	208
Magnesium (Mg)	87	107	97	95	78
Total Hardness ($CaCO_3$)	960	1,000	980	910	840
Sodium (Na)	215	275	250	251	195
Potassium (K)	5.0	15	4.1	--	6.4
Chloride (Cl)	310	375	335	295	225
Sulfate(SO_4)	800	775	775	839	600
Alkalinity ($CaCO_3$)	228	164	192	164	232
Nitrate (N)	--	--	--	0.4	--
Silica(SiO_2)	12.0	13.2	15.4	17.0	15.4
Fluoride (F)	0.70	0.60	0.71	0.6	0.81

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 481
Location: Salt Fork Red River at Mangum, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	10/28/59	12/28/59	2/15/60	2/25/60	2/29/60
Laboratory:	USGS	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	--	--	11:45 am	10:25 am	10:05 am
Temperature of stream: °F	--	--	39	--	31
Discharge (cfs)	0.5	78	188	183	--
Spec. cond. micromhos @ 25° C (field)	--	--	2,750	--	3,500
Spec. cond. micromhos @ 25° C (lab.)	2,830	2,000	2,500	3,290	3,500
pH	7.6	7.7	7.8	7.8	8.0
Turbidity, Jackson units	--	600	40	--	300
Dissolved solids*	2,440	1,784	1,900	2,820	2,880
Boron (B)	0.42	0.21	0.16	0.34	0.24
Calcium (Ca)	520	268	136	508	450
Magnesium (Mg)	74	73	70	125	97
Total Hardness ($CaCO_3$)	1,600	970	640	1,780	1,600
Sodium (Na)	131	150	612	(Na+K) 192	180
Potassium (K)	--	5.4	4.8	--	6.3
Chloride (Cl)	188	200	830	260	220
Sulfate(SO_4)	1,440	875	32	1,580	1,750
Alkalinity ($CaCO_3$)	118	140	290	180	170
Nitrate (N)	0.27	--	--	0.8	--
Silica(SiO_2)	18	16.8	11.3	20	16.4
Fluoride (F)	0.5	0.7	0.32	1.0	0.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 481
Location: Salt Fork Red River at Mangum, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	3/22/60	5/18/60	5/25/60	6/15/60	6/22/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	5:25 pm	8:40 am	9:05 am	11:05 am	9:45 am
Temperature of stream: °F	60	67	--	84	82
Discharge (cfs)	39	--	90	68	22
Spec. cond. micromhos @ 25° C (field)	2,600	3,050	--	1,875	3,075
Spec. cond. micromhos @ 25° C (lab.)	2,700	3,400	2,280	1,700	2,750
pH	7.7	7.9	7.4	7.5	7.7
Turbidity, Jackson units	--	--	--	650	< 25
Dissolved solids*	2,600	3,089	1,950	1,319	2,330
Boron (B)	0.19	0.11	0.41	0.09	0.5
Calcium (Ca)	392	456	320	228	396
Magnesium (Mg)	112	141	71	51	107
Total Hardness ($CaCO_3$)	1,440	1,720	1,090	780	1,430
Sodium (Na)	198	202	150	100	170
Potassium (K)	6.9	9.1	--	6.7	8.2
Chloride (Cl)	210	260	182	110	215
Sulfate(SO_4)	1,225	1,700	1,020	640	1,300
Alkalinity ($CaCO_3$)	130	100	97	140	104
Nitrate (N)	--	--	0.0	--	--
Silica(SiO_2)	16.4	10.0	14	14.2	16.5
Fluoride (F)	0.8	0.46	0.7	0.20	0.6

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at $103^{\circ}C$ by SEC laboratory and at $180^{\circ}C$ by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 481
Location: Salt Fork Red River at Mangum, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	7/12/60	7/19/60	9/14/60	10/11/60	10/18/60
Laboratory:	USGS	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	4:35 pm	4:30 pm	8:20 am	1:00 pm	1:40 pm
Temperature of stream: °F	--	87	66	--	61
Discharge (cfs)	16	11	9.8	77	10,300
Spec. cond. micromhos @ 25° C (field)	--	2,400	2,200	2,950	850
Spec. cond. micromhos @ 25° C (lab.)	1,660	2,100	2,000	2,920	1,020
pH	7.8	7.8	7.7	7.6	7.5
Turbidity, Jackson units	--	52	270	--	5,000
Dissolved solids*	1,250	1,950	1,675	2,710	710
Boron (B)	0.24	0.38	0.20	0.47	0.5
Calcium (Ca)	192	300	280	480	160
Magnesium (Mg)	45	83	58	88	24
Total Hardness ($CaCO_3$)	665	1,090	940	1,560	500
Sodium (Na)	129	160	130	180	32
Potassium (K)	--	6.9	6.9	--	4.9
Chloride (Cl)	152	190	190	210	50
Sulfate(SO_4)	619	975	900	1,510	325
Alkalinity ($CaCO_3$)	85	96	112	80	172
Nitrate (N)	0.1	--	--	0.2	--
Silica(SiO_2)	17	15.4	13.4	17	12.0
Fluoride (F)	0.7	0.6	0.8	0.6	0.5

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 481
Location: Salt Fork Red River at Mangum, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	11/16/60	12/13/60	1/17/61	1/24/61	2/15/61
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	10:00 am	3:45 am	1:10 pm	2:25 pm	10:50 am
Temperature of stream: °F	53	71	80.5	71	77
Discharge (cfs)	89	357	79	35	70
Spec. cond. micromhos @ 25° C (field)	2,650	2,020	--	2,959	2,720
Spec. cond. micromhos @ 25° C (lab.)	2,570	2,020	2,610	2,940	2,450
pH	7.5	7.3	7.7	7.5	7.45
Turbidity, Jackson units	< 25	--	--	--	81
Dissolved solids*	2,155	1,496	2,280	2,358	2,094
Boron (B)	0.28	0.18	0.30	0.29	0.16
Calcium (Ca)	360	240	376	400	324
Magnesium (Mg)	97	63	93	134	83
Total Hardness ($CaCO_3$)	1,300	860	1,320	1,550	1,150
Sodium (Na)	175	131	167	165	140
Potassium (K)	6.0	4.5	--	5.5	6.2
Chloride (Cl)	200	180	210	225	195
Sulfate(SO_4)	1,150	825	1,200	1,250	1,063
Alkalinity ($CaCO_3$)	128	120	135	148	132
Nitrate (N)	--	--	0.4	--	--
Silica(SiO_2)	14.5	14	18	14.3	10.4
Fluoride (F)	0.3	0.48	0.6	0.76	0.49

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 481
Location: Salt Fork Red River at Mangum, Oklahoma
Basin: Red River
Tributary to: Red River

Date collected:	3/14/61	4/11/61	4/19/61	5/23/61	
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	
Time of collection:	5:00 pm	3:05 pm	9:35 am	3:50 pm	
Temperature of stream: °F	66	--	69	82	
Discharge (cfs)	30	65	14	11	
Spec. cond. micromhos @ 25° C (field)	3,100	--	--	3,250	
Spec. cond. micromhos @ 25° C (lab.)	3,160	3,216	3,000	3,420	
pH	7.2	7.5	7.7	7.3	
Turbidity, Jackson units	< 25	118	--	< 25	
Dissolved solids*	2,799	2,792	2,720	3,058	
Boron (B)	0.03	0.475	0.75	0.93	
Calcium (Ca)	460	440	444	560	
Magnesium (Mg)	121	21	122	122	
Total Hardness ($CaCO_3$)	1,650	1,600	1,610	1,900	
Sodium (Na)	170	220	187	195	
Potassium (K)	25	7.9	--	9.5	
Chloride (Cl)	230	375	200	240	
Sulfate(SO_4)	1,650	1,475	1,550	1,750	
Alkalinity ($CaCO_3$)	120	136	118	92	
Nitrate (N)	--	--	0.5	--	
Silica(SiO_2)	13.9	13.0	16	11.0	
Fluoride (F)	0.87	0.60	0.6	0.92	

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 703
Location: Salt Fork of Red River near Wellington, Texas
Basin: Red River
Tributary to: Red River

Date collected:	** 10/28/59	12/9/59	12/28/59	2/15/60	2/24/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	4:40 pm	12:35 pm
Temperature of stream: °F	--	--	--	54	--
Discharge (cfs)	6.2	16	78	64	67
Spec. cond. micromhos @ 25° C (field)	--	--	--	2,700	--
Spec. cond. micromhos @ 25° C (lab.)	3,130	2,900	2,050	2,400	3,180
pH	7.5	7.6	7.6	7.9	7.8
Turbidity, Jackson units	--	< 25	300	200	--
Dissolved solids*	2,720	2,790	1,860	1,930	2,750
Boron (B)	0.23	0.19	0.35	0.23	0.17
Calcium (Ca)	568	475	276	272	480
Magnesium (Mg)	98	76	75	102	105
Total Hardness ($CaCO_3$)	1,820	1,500	1,000	1,100	1,630
Sodium (Na)	137	220	64	180	(Na+K) 198
Potassium (K)	--	5.0	5.1	5.2	--
Chloride (Cl)	242	300	240	230	295
Sulfate(SO_4)	1,570	1,300	950	950	1,390
Alkalinity ($CaCO_3$)	138	120	170	150	194
Nitrate (N)	0.68	0.5	--	--	0.7
Silica(SiO_2)	21.0	26.4	19.0	19.6	22.0
Fluoride (F)	0.7	1.1	0.8	0.32	0.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

** Analytical resuuts expressed as parts per million except as noted (column 1 only) Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 703
Location: Salt Fork of Red River near Wellington, Texas
Basin: Red River
Tributary to: Red River

Date collected:	3/1/60	3/22/60	4/26/60	5/17/60	5/24/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	2:00 pm	11:15 pm	9:50 am	11:10 am	10:30 am
Temperature of stream: °F	32	60	61	--	--
Discharge (cfs)	50	91	3	4.8	2.7
Spec. cond. micromhos @ 25° C (field)	3,100	2,750	3,000	2,900	--
Spec. cond. micromhos @ 25° C (lab.)	3,200	3,000	3,600	2,900	2,920
pH	7.9	7.8	7.6	7.8	7.8
Turbidity, Jackson units	30	< 25	27	--	--
Dissolved solids*	2,590	2,380	2,885	2,797	2,630
Boron (B)	0.08	0.12	0.13	0.14	0.34
Calcium (Ca)	365	400	528	520	472
Magnesium (Mg)	110	73	83	92	83
Total Hardness ($CaCO_3$)	1,400	1,300	1,680	1,630	1,520
Sodium (Na)	215	205	173	170	177
Potassium (K)	5.7	3.9	5.5	5.0	--
Chloride (Cl)	250	270	240	190	225
Sulfate(SO_4)	1,450	1,050	1,600	1,450	1,390
Alkalinity ($CaCO_3$)	180	140	180	140	136
Nitrate (N)	--	--	--	--	0.7
Silica(SiO_2)	20.0	18.6	16.2	18.6	22.0
Fluoride (F)	0.9	0.8	1.1	0.48	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 703
Location: Salt Fork of Red River near Wellington, Texas
Basin: Red River
Tributary to: Red River

Date collected:	6/14/60	6/21/60	7/12/60	7/19/60	8/16/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	11:45 am	12:00 N	11:55 am	11:30 am	8:45 am
Temperature of stream: °F	80	88	--	82	70
Discharge (cfs)	54	12	26	25	6.2
Spec. cond. micromhos @ 25° C (field)	2,150	3,350	--	1,600	3,100
Spec. cond. micromhos @ 25° C (lab.)	1,900	3,100	2,200	1,400	2,750
pH	8.1	7.8	7.7	7.6	7.9
Turbidity, Jackson units	420	< 25	--	900	< 25
Dissolved solids*	1,488	--	1,770	1,175	2,720
Boron (B)	0.05	0.2	0.31	0.20	0.34
Calcium (Ca)	244	455	278	172	520
Magnesium (Mg)	46	92	65	51	107
Total Hardness ($CaCO_3$)	800	1,520	960	640	1,740
Sodium (Na)	135	175	169	125	145
Potassium (K)	6.7	6.5	--	5.6	4.3
Chloride (Cl)	180	295	215	155	195
Sulfate(SO_4)	575	1,150	881	440	1,530
Alkalinity ($CaCO_3$)	148	120	103	144	140
Nitrate (N)	--	--	0.3	--	--
Silica(SiO_2)	15.4	16.9	21.0	16.4	17.2
Fluoride (F)	0.30	0.6	0.7	0.6	0.9

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 703
Location: Salt Fork of Red River near Wellington, Texas
Basin: Red River
Tributary to: Red River

Date collected:	9/13/60	10/11/60	10/18/60	11/15/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	11:30 am	8:55 am	10:25 am	2:45 pm	11:35 am
Temperature of stream: °F	83	--	58	55	72
Discharge (cfs)	13	16	2,420	72	--
Spec. cond. micromhos @ 25° C (field)	3,000	3,300	700	2,650	2,060
Spec. cond. micromhos @ 25° C (lab.)	2,750	3,230	725	2,549	1,970
pH	7.9	7.8	7.5	7.7	7.6
Turbidity, Jackson units	71	--	5,000	< 25	--
Dissolved solids*	2,530	3,000	530	1,920	1,471
Boron (B)	0.27	0.36	0.07	0.19	0.20
Calcium (Ca)	428	532	96	296	220
Magnesium (Mg)	92	83	24	80	61
Total Hardness ($CaCO_3$)	1,450	1,670	340	1,070	800
Sodium (Na)	175	233	41	198	138
Potassium (K)	2.8	--	4.6	5.3	4.5
Chloride (Cl)	340	300	60	260	195
Sulfate(SO_4)	1,325	1,560	200	825	662
Alkalinity ($CaCO_3$)	124	126	144	268	164
Nitrate (N)	--	0.7	--	--	--
Silica(SiO_2)	15.4	22.0	12.0	16.2	14.5
Fluoride (F)	0.7	0.7	0.6	0.5	0.70

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 703
Location: Salt Fork of Red River near Wellington, Texas
Basin: Red River
Tributary to: Red River

Date collected:	1/17/61	1/24/61	2/14/61	3/14/61	4/11/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	9:35 am	10:55 am	11:30 am	11:40 am	10:25 am
Temperature of stream: °F	81	71	76	60	77
Discharge (cfs)	37	68	88	30	30
Spec. cond. micromhos @ 25° C (field)	--	2,517	2,150	3,000	--
Spec. cond. micromhos @ 25° C (lab.)	2,510	2,430	2,500	3,000	2,496
pH	7.8	7.65	7.5	7.55	--
Turbidity, Jackson units	--	--	< 25	--	< 25
Dissolved solids*	2,040	1,855	2,031	2,444	2,047
Boron (B)	0.23	0.17	0.13	0.22	0.3
Calcium (Ca)	320	276	324	404	344
Magnesium (Mg)	78	73	78	87	78
Total Hardness ($CaCO_3$)	1,120	990	1,130	1,370	1,180
Sodium (Na)	195	184	190	205	155
Potassium (K)	--	4.5	5.0	4.5	4.9
Chloride (Cl)	255	255	240	270	210
Sulfate (SO_4)	986	900	1,000	1,275	975
Alkalinity ($CaCO_3$)	154	148	152	136	144
Nitrate (N)	0.3	--	--	--	--
Silica (SiO_2)	19.0	14.5	10.4	15.8	15.4
Fluoride (F)	0.7	0.87	0.64	0.50	0.76

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 703
Location: Salt Fork of Red River near Wellington, Texas
Basin: Red River
Tributary to: Red River

Date collected:	4/18/61	5/23/61			
Laboratory:	USGS	RATSEC			
Time of collection:	2:10 pm	10:25 am			
Temperature of stream: °F	77	71			
Discharge (cfs)	13	9.3			
Spec. cond. micromhos @ 25° C (field)	--	2,500			
Spec. cond. micromhos @ 25° C (lab.)	2,620	2,450			
pH	7.9	7.55			
Turbidity, Jackson units	--	> 25			
Dissolved solids*	2,250	2,070			
Boron (B)	0.28	0.20			
Calcium (Ca)	386	392			
Magnesium (Mg)	77	73			
Total Hardness ($CaCO_3$)	1,280	1,280			
Sodium (Na)	186	150			
Potassium (K)	--	4.4			
Chloride (Cl)	215	155			
Sulfate(SO_4)	1,180	1,100			
Alkalinity ($CaCO_3$)	148	172			
Nitrate (N)	0.8	--			
Silica(SiO_2)	25	16.9			
Fluoride (F)	0.7	0.66			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 750
Location: Red River near Quanah, Texas
Basin: Red River
Tributary to: --

Date collected:	10/29/59	12/10/59	12/30/59	2/16/60	2/23/60
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	--	--	--	2:45 pm	4:15 pm
Temperature of stream: °F	50	--	--	46	--
Discharge (cfs)	--	12	64	28	10
Spec. cond. micromhos @ 25° C (field)	--	--	--	27,500	--
Spec. cond. micromhos @ 25° C (lab.)	15,200	21,000	25,000	26,000	23,100
pH	7.7	7.5	7.7	7.7	7.6
Turbidity, Jackson units	--	30	400	50	--
Dissolved solids*	10,500	16,100	17,900	18,200	16,100
Boron (B)	1.1	0.52	0.60	0.42	.42
Calcium (Ca)	776	1,070	784	840	872
Magnesium (Mg)	208	82	289	243	247
Total Hardness ($CaCO_3$)	2,790	3,000	3,150	4,100	3,190
Sodium (Na)	2,720	4,200	2,300	5,400	(Na+K) 4,560
Potassium (K)	--	220	24.2	29.0	--
Chloride (Cl)	4,330	7,000	8,900	8,200	7,280
Sulfate(SO_4)	2,350	1,500	2,750	2,700	2,570
Alkalinity ($CaCO_3$)	147	130	160	140	154
Nitrate (N)	1.24	--	--	--	--
Silica(SiO_2)	7.5	16.8	14.0	13.0	16
Fluoride (F)	0.6	1.8	1.1	0.56	.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 750
Location: Red River near Quanah, Texas
Basin: Red River
Tributary to: --

Date collected:	3/2/60	3/21/60	4/25/60	5/18/60	5/25/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	USGS
Time of collection:	11:15 am	4:30 pm	2:30 pm	2:55 pm	3:45 pm
Temperature of stream: °F	32	67	81	--	--
Discharge (cfs)	40	11	3.2	60	146
Spec. cond. micromhos @ 25° C (field)	26,000	23,000	16,800	10,400	--
Spec. cond. micromhos @ 25° C (lab.)	24,000	20,500	15,500	9,600	16,600
pH	7.9	7.6	7.8	7.6	7.6
Turbidity, Jackson units	30	< 25	< 25	--	--
Dissolved solids*	19,000	15,740	12,070	7,165	11,400
Boron (B)	.38	0.55	.22	0.33	.79
Calcium (Ca)	840	840	840	576	655
Magnesium (Mg)	210	270	219	87	152
Total Hardness ($CaCO_3$)	2,950	3,200	3,000	1,800	2,260
Sodium (Na)	5,500	5,400	2,825	1,750	3,150
Potassium (K)	28.0	3.3	4.0	11.7	--
Chloride (Cl)	8,000	6,700	4,300	2,600	4,970
Sulfate(SO_4)	3,000	1,300	2,500	1,600	1,940
Alkalinity ($CaCO_3$)	140	120	130	100	89
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	12.4	12.6	11.1	10.6	16
Fluoride (F)	0.9	0.7	.75	0.40	.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 750
Location: Red River near Quanah, Texas
Basin: Red River
Tributary to: --

Date collected:	6/15/60	6/23/60	7/13/60	7/20/60	8/17/60
Laboratory:	RATSEC	RATSEC	USGS	RATSEC	RATSEC
Time of collection:	5:25 pm	9:20 am	11:35 am	10:40 am	10:30 am
Temperature of stream: °F	87	75	--	79	80
Discharge (cfs)	548	43	936	193	30
Spec. cond. micromhos @ 25° C (field)	9,100	20,000	--	9,100	16,000
Spec. cond. micromhos @ 25° C (lab.)	8,300	18,300	6,200	7,500	14,100
pH	7.8	7.5	7.8	7.6	7.9
Turbidity, Jackson units	3,000	110	--	1,000	600
Dissolved solids*	6,272	13,810	3,980	5,575	10,180
Boron (B)	0.17	0.6	.35	0.44	0.59
Calcium (Ca)	536	780	296	376	560
Magnesium (Mg)	63	194	44	87	182
Total Hardness ($CaCO_3$)	1,600	2,750	920	1,300	2,150
Sodium (Na)	1,500	3,450	1,060	1,375	3,170
Potassium (K)	15.1	21.2	--	10.5	17.5
Chloride (Cl)	2,350	6,000	1,600	2,050	4,800
Sulfate(SO_4)	1,175	2,125	803	1,050	1,530
Alkalinity ($CaCO_3$)	136	112	121	104	140
Nitrate (N)	--	--	.3	--	--
Silica(SiO_2)	15.0	15.6	18	14.8	14.0
Fluoride (F)	0.45	1.3	.9	0.5	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 750
Location: Red River near Quanah, Texas
Basin: Red River
Tributary to: --

Date collected:	9/12/60	10/10/60	10/17/60	11/14/60	12/12/60
Laboratory:	RATSEC	USGS	RATSEC	RATSEC	RATSEC
Time of collection:	2:20 pm	2:00 pm	2:55 pm	2:45 pm	9:50 am
Temperature of stream: °F	84	--	62	70	72
Discharge (cfs)	75	2.5	2,350	63	152
Spec. cond. micromhos @ 25° C (field)	21,500	19,500	7,700	23,750	17,400
Spec. cond. micromhos @ 25° C (lab.)	19,400	18,800	7,000	22,360	15,880
pH	7.9	7.6	7.3	7.4	7.4
Turbidity, Jackson units	> 5,000	--	5,000	< 25	--
Dissolved solids*	14,090	13,700	4,535	15,445	11,194
Boron (B)	0.79	1.8	0.30	0.78	.62
Calcium (Ca)	800	825	360	760	620
Magnesium (Mg)	170	219	63	194	158
Total Hardness ($CaCO_3$)	2,700	2,960	1,160	2,700	2,200
Sodium (Na)	3,925	3,680	913	4,300	3,300
Potassium (K)	10.5	--	11.3	5.5	17
Chloride (Cl)	6,750	5,910	1,050	7,500	5,250
Sulfate (SO_4)	2,300	2,420	963	2,200	1,900
Alkalinity ($CaCO_3$)	148	106	144	116	148
Nitrate (N)	--	--	--	--	--
Silica (SiO_2)	12.3	20	14.2	12.0	11.9
Fluoride (F)	TR	.6	0.8	0.5	.65

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 750
Location: Red River near Quanah, Texas
Basin: Red River
Tributary to: --

Date collected:	1/16/61	1/23/61	2/13/61	3/13/61	4/10/61
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	1:25 pm	1:40 pm	1:35 am	2:00 pm	1:00 pm
Temperature of stream: °F	80	70	76.5	67	--
Discharge (cfs)	58	35	119	6	41
Spec. cond. micromhos @ 25° C (field)	--	24,198	23,200	22,000	--
Spec. cond. micromhos @ 25° C (lab.)	24,600	21,500	21,200	21,000	23,040
pH	7.7	7.5	7.6	7.55	--
Turbidity, Jackson units	--	--	> 25	--	33
Dissolved solids*	17,000	15,749	15,827	14,917	15,661
Boron (B)	1.1	.80	.87	.76	.57
Calcium (Ca)	861	760	740	800	840
Magnesium (Mg)	219	219	219	218	182
Total Hardness ($CaCO_3$)	3,050	2,800	2,750	2,900	2,850
Sodium (Na)	4,960	4,500	4,100	3,800	4,100
Potassium (K)	--	15.6	19.3	18.2	17.8
Chloride (Cl)	7,920	7,550	6,800	6,850	7,100
Sulfate(SO_4)	2,430	2,350	2,320	2,550	2,475
Alkalinity ($CaCO_3$)	136	148	128	124	116
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	17	9.7	7.0	10.6	10.8
Fluoride (F)	.7	.93	.54	.66	.65

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 750
Location: Red River near Quanah, Texas
Basin: Red River
Tributary to:

Date collected:	4/17/61	5/24/61			
Laboratory:	USGS	RATSEC			
Time of collection:	4:00 pm	9:50 am			
Temperature of stream: °F	77	66			
Discharge (cfs)	19	23			
Spec. cond. micromhos @ 25° C (field)	--	20,000			
Spec. cond. micromhos @ 25° C (lab.)	20,100	20,500			
pH	7.7	7.3			
Turbidity, Jackson units	--	> 25			
Dissolved solids*	14,300	14,026			
Boron (B)	1.5	.76			
Calcium (Ca)	813	860			
Magnesium (Mg)	241	207			
Total Hardness ($CaCO_3$)	3,020	3,000			
Sodium (Na)	3,880	3,700			
Potassium (K)	--	18.0			
Chloride (Cl)	6,190	6,100			
Sulfate (SO_4)	2,500	2,500			
Alkalinity ($CaCO_3$)	124	112			
Nitrate (N)	--	--			
Silica (SiO_2)	17	10.8			
Fluoride (F)	.7	.97			

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 478
Location: Red River near Brice, Texas
Basin: Red River
Tributary to: --

Date collected:	11/3/59	12/30/59	2/16/60	2/24/60	3/1/60
Laboratory:	USGS	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	--	--	11:15 am	10:55 am	3:40 pm
Temperature of stream: °F	--	--	47	--	30.5
Discharge (cfs)	--	9.3	2.9	.4	7.8
Spec. cond. micromhos @ 25° C (field)	--	--	26,000	--	27,000
Spec. cond. micromhos @ 25° C (lab.)	15,900	19,500	25,000	62,500	27,000
pH	7.5	7.9	7.5	7.6	8.0
Turbidity, Jackson units	--	140	< 25	--	35
Dissolved solids*	10,400	14,100	18,100	46,400	20,400
Boron (B)	0.72	0.57	0.45	1.1	.46
Calcium (Ca)	644	680	800	1,280	880
Magnesium (Mg)	81	192	194	520	240
Total Hardness ($CaCO_3$)	1,940	2,490	2,800	5,330	2,050
Sodium (Na)	3,100	1,750	5,250	(Na+K) 15,600	6,350
Potassium (K)	--	35.0	50.0	--	55.0
Chloride (Cl)	4,920	6,450	7,900	25,200	8,800
Sulfate(SO_4)	1,570	2,040	2,450	3,460	2,450
Alkalinity ($CaCO_3$)	108	130	120	167	120
Nitrate (N)	0.45	--	--	--	--
Silica(SiO_2)	10	17.0	17.8	17	17.0
Fluoride (F)	0.9	1.2	0.78	.9	1.0

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.
Na and K calculated as Na.

CHEMICAL ANALYSES

PHS Station No.: 478
Location: Red River near Brice, Texas
Basin: Red River
Tributary to: --

Date collected:	5/20/60	6/14/60	6/21/60	7/12/60	7/19/60
Laboratory:	USGS	RATSEC	RATSEC	USGS	RATSEC
Time of collection:	12:20 pm	9:30 am	9:45 am	9:25 am	9:00 am
Temperature of stream: °F	65	72	81	--	79
Discharge (cfs)	--	200	8	365	76
Spec. cond. micromhos @ 25° C (field)	--	6,350	19,000	--	10,000
Spec. cond. micromhos @ 25° C (lab.)	11,400	5,800	17,000	2,630	8,200
pH	7.7	7.9	7.6	7.7	7.6
Turbidity, Jackson units	--	3,000	80	--	700
Dissolved solids*	8,380	4,102	12,850	1,680	6,300
Boron (B)	.54	0.11	0.6	.22	0.46
Calcium (Ca)	767	352	780	184	460
Magnesium (Mg)	201	53	146	39	146
Total Hardness ($CaCO_3$)	2,740	1,100	2,550	620	1,750
Sodium (Na)	1,740	1,060	3,175	337	1,550
Potassium (K)	--	15.2	40	--	14.0
Chloride (Cl)	2,990	1,440	5,250	525	2,525
Sulfate(SO_4)	2,080	725	2,050	475	1,300
Alkalinity ($CaCO_3$)	147	140	112	115	100
Nitrate (N)	.3	--	--	.2	--
Silica(SiO_2)	22	14.6	17.6	17	16.4
Fluoride (F)	.5	0.70	1.0	.9	0.7

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 478
Location: Red River near Brice, Texas
Basin: Red River
Tributary to: --

Date collected:	8/15/60	9/13/60	10/18/60	11/15/60	12/13/60
Laboratory:	RATSEC	RATSEC	RATSEC	RATSEC	RATSEC
Time of collection:	3:30 pm	10:00 am	8:40 am	1:30 pm	10:00 am
Temperature of stream: °F	89	75	58	55	71
Discharge (cfs)	0.1	15	7,120	11	15
Spec. cond. micromhos @ 25° C (field)	8,600	22,000	2,400	20,100	23,700
Spec. cond. micromhos @ 25° C (lab.)	7,700	19,800	2,800	18,720	21,660
pH	7.9	7.7	7.7	7.4	7.5
Turbidity, Jackson units	330	200	5,000	< 25	--
Dissolved solids*	5,680	14,310	1,825	13,120	15,708
Boron (B)	0.46	0.91	0.26	0.76	.91
Calcium (Ca)	408	660	232	700	780
Magnesium (Mg)	117	182	29	219	328
Total Hardness ($CaCO_3$)	1,500	2,400	700	2,650	3,300
Sodium (Na)	1,550	4,000	210	4,100	4,500
Potassium (K)	24.0	18.8	8.1	41.0	40.5
Chloride (Cl)	2,325	6,950	500	6,000	7,500
Sulfate(SO_4)	1,230	1,950	562	2,000	2,300
Alkalinity ($CaCO_3$)	120	108	124	112	140
Nitrate (N)	--	--	--	--	--
Silica(SiO_2)	9.2	14.5	11.0	16.4	13.2
Fluoride (F)	1.1	0.8	0.4	1.1	1.26

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.

CHEMICAL ANALYSES

PHS Station No.: 478
Location: Red River near Brice, Texas
Basin: Red River
Tributary to: --

Date collected:	1/17/61	1/24/61	2/14/61	4/11/61	
Laboratory:	USGS	RATSEC	RATSEC	RATSEC	
Time of collection:	7:50 am	9:05 am	10:05 am	8:45 am	
Temperature of stream: °F	81.5	71	75.5	7.5	
Discharge (cfs)	3	2	2	1	
Spec. cond. micromhos @ 25° C (field)	--	37,195	30,800	--	
Spec. cond. micromhos @ 25° C (lab.)	28,600	32,800	27,500	37,344	
pH	7.7	7.5	7.5	--	
Turbidity, Jackson units	--	--	> 25	> 25	
Dissolved solids*	20,200	24,872	20,892	27,608	
Boron (B)	1.3	1.19	1.1	.85	
Calcium (Ca)	929	900	860	1,080	
Magnesium (Mg)	162	316	279	389	
Total Hardness ($CaCO_3$)	2,430	3,550	3,300	4,300	
Sodium (Na)	2,780	7,350	5,000	7,500	
Potassium (K)	--	55.5	67.5	56.5	
Chloride (Cl)	4,470	12,400	9,950	13,400	
Sulfate(SO_4)	1,950	2,900	2,950	3,100	
Alkalinity ($CaCO_3$)	142	168	128	124	
Nitrate (N)	.0	--	--	--	
Silica(SiO_2)	16	14.5	10.0	17.4	
Fluoride (F)	.5	1.27	.75	.71	

All chemical analyses expressed as milligrams per liter, except pH and unless otherwise indicated.

* Determined at 103°C by SEC laboratory and at 180°C by USGS laboratory.